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ELEMENTS

OF THE

PRACTICE OF PHYSIC,

PRESENTING A VIEW OF THE PRESENT STATE OF

SPECIAL PATHOLOGY

AND

THERAPEUTICS

BY

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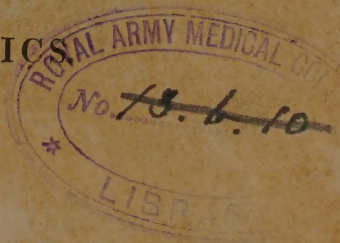
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VOLUME FIRST.

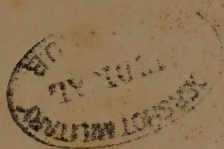
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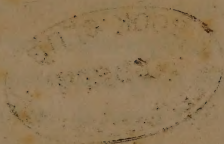




PRACTICE OF PHYSIC.

VOLUME FIRST.

- I. FEVERS.
- II. CUTANEOUS INFLAMMATIONS.
- III. MUCOUS INFLAMMATIONS.



P R E F A C E.

THE Practice of Physic is a subject so comprehensive and complicated, that it can be wonderful to no accomplished and reflecting physician, that it is undergoing constant changes and modifications in its principles and their practical applications. As it consists of the several branches of nosology, nosography, etiology, pathology, and therapeutics, and derives its materials from the elementary sciences of anatomy, physiology, and chemistry,—it is manifest that of every improvement in each of these departments, it must partake; and as some of these departments, especially those of general and special pathology and special therapeutics, are daily receiving new accessions, and undergoing new modifications, from new views in anatomy, healthy and morbid, in physiology, and in *materia medica*, it necessarily results that their respective applications to the healing art change, modify, and improve that great object of all the labours of the medical philosopher. It hence follows that those works which propose to unfold the principles and establish the practical rules of the art of healing, become, in the progress of years, more or less obsolete and unsuited for their original purpose, and require from time to time to be modified in order to suit the advancing state of the different elementary sciences.

Of all the works subjected to this species of ordeal, the First

Lines of Dr Cullen has been allowed on all hands to have endured it for the longest time, and most happily ; and the proof of this is found in the fact, that it has not only gone through many editions, but has formed the basis of most of the works which have since appeared, and has been thought worthy of being itself adapted to the present state of knowledge by two accomplished and rising physicians, both since dead.

It would be no compliment, however, to the able and laborious physiologists, pathologists, and physicians, by whose diligence and skill, medicine, both as a science and as an art, has been at once, during the last fifty years, extended, improved, and simplified, to believe, that any partial and temporary efforts of this kind could suit the increasing wants of the student and practitioner of medicine ; and every one acquainted with the history of medicine during the period referred to, must perceive, that it is requisite for any Treatise on the Practice of Physic, to be entirely new modelled, and to embody, in one uniform, harmonious, and comprehensive system, the whole of the theoretical principles, and the practical applications of which the art of preventing and curing diseases now consists.

Upon the principles now stated, I have composed the present work. In the course of my experience as Lecturer on the Practice of Physic and Clinical Medicine, I found that, for information on many points which necessarily became the subjects of discussion, it was requisite to refer either to foreign works or to monographs, not accessible to students, or to works which their other engagements did not allow them leisure to consult. It appeared to me, therefore, that if the most material points in special pathology and therapeutics, with the various facts on which they rested, were collected, and arranged in a work of moderate compass, it would at once facilitate my own labour and that of the student, and might act as a guide to direct those who wished more detailed information, to select the proper path, and consult the best authorities.

The present undertaking is the result of this persuasion ; and I now submit it to the profession, and especially its younger

members, in the hope that it may be useful, and that it may enable them to form correct ideas on the pathology and treatment of the diseases incident to the different textures and organs of the human frame.

With regard to the manner in which this work is composed, one observation is requisite. It has been my study throughout to present such a view of Special Pathology and Therapeutics, as may be justly said to be the united result of the observation and researches of all the ablest pathologists and physicians, by whom the science of medicine has been cultivated, and by whom its art has been simplified, improved, and rendered energetic. In the prosecution of this method, I have applied to Medicine the same principles which have been long applied to the physical and physiological sciences in general, and to morals, and to law, public and particular. The facts and classes of facts recorded by different observers, I have examined, compared, and analyzed; where the results have varied, I have studied to discover the causes on which the discordance depended; where they have been proved to be erroneous, I have studied to rectify them by the result of the labours of others, or by my own experience; where they have been defective, I have by the same means endeavoured to supply what is wanting; and from the whole, I have cautiously deduced correct and legitimate general principles; and have specified the points in which particular exceptions become requisite.

I am not unaware that it is the opinion of some, that a work on the Practice of Physic ought to be the result of the individual experience of the author alone; that all previous and much contemporaneous evidence ought to be rejected; and that he impairs the authority of his work by admitting the results of the labours of predecessors, and sometimes of contemporaries. It is a melancholy proof of the want of true philosophical principles in our systems of medical education, that this fancy is exclusively confined to medicine. It may be said to be a psychological impossibility to construct a work on the Practice of Physic on such principles; and if it were practicable the work

would be altogether useless. Such a performance could never rise above the rank of representing the individual views of the author ; and, whatever might be its value in that character, it could have none as a system exhibiting the combined results of the united labours of many inquirers. Medicine, though a science abounding in contradictory facts and loose speculations, nevertheless admits of a reasonable degree of certainty and precision. It is only where observations are inaccurately made by careless and incompetent observers, and loosely and confusedly recorded by those who shun logical arrangement as a thing to be denounced, upon the delusive sophistry that it is incompatible with practical promptitude and energy, that facts lose their value, and deductions become erroneous, and consequently unsafe and pernicious.

To this evil, however, if its existence be real, whether as to the causes and nature of diseases, or the effects of remedies and methods of treatment, a ready antidote is found in the multiplicity and the variety of the observations recorded ; and, by the mind that pursues inquiry in the spirit of candour, steadiness, and perseverance, truth will rarely fail to be found.

These views I have endeavoured in the present work to realize. To what extent the attempt has been successful, or whether it has been successful at all, it is left for others to determine.

Of one point, which I consider important in a system of instructions on the Practice of Physic, I have studied never to lose sight. This is, to establish so close and intimate a relation between the pathological characters of diseases and the therapeutic means to be employed in removing them, that the latter shall in all cases be, as nearly as is practicable, the result of the former. By this means only can we hope to see in the therapeutic department, simplicity combined with energy, and the system of random and fortuitous prescription entirely banished. When the physician is at a loss, it is wiser to do nothing than to recommend what may be injurious.

In the enumeration of authorities on the subject of particular diseases, the arrangement of which is chronological, I have studied

to select the most important, the most instructive, and the most accessible treatises, essays, and monographs on each. In some instances I am aware that I may have deviated from the principles now specified. But in general this has not been done without cogent reasons.

On certain subjects, it may be observed, that there is a coincidence between the doctrines taught in the present work and those promulgated in various articles in the *Edinburgh Medical and Surgical Journal*.

Thus, in the chapter on the cutaneous disease of the North, viz. the Radesyge, the reader may recognize a resemblance between the views there given and those presented in the 18th volume of the *Journal*. It is requisite, therefore, for me to say, that I am the author of the article on the works of Dr Holst and Dr Struve on that subject, and that I have reperused all the works to which I have referred in the beginning of the section in the present work. From these, the account now given is condensed to suit the limits of the treatise; but none of the material points, pathological or therapeutic, are omitted.

Further, as the reader will recognize some resemblance between the manner in which Chronic Bronchitis and Chronic Pleurisy are treated in the present work, and the article on the Sanability of Consumption in the 21st volume of the *Edinburgh Journal*, I must avow myself as the author of that article; and, as the paper soon afterwards appeared in the Italian language in the best *Journal* published in Italy,* I take the present opportunity of thus publicly returning thanks to Professor Omodei for the honour he has done me.

Lastly, To some diseases not recognized by English physicians as distinct affections, I have, in compliance with the example of the best foreign authors, assigned a separate position, and between several diseases which are still confounded by some English and most foreign physicians, I have found it requisite to draw a broad, and I trust, visible line of distinc-

* *Annali Universali di Medecina* Compilato da Annibale Omodei, anno 1825. Vol. xxxv. p. 105. Milano, 1825, and Vol. xxxvi. p. 214.

tion. Thus, Gastric and Gastro-enteric Fever receives a distinct place among febrile disorders, and is, on the one hand, distinguished from *Gastritis*, and on the other from *Enteritis* and Dysentery. To *Cynanche Laryngea*, or Inflammation of the *Larynx*, which is still by Joseph Frank and many others, both in this country and abroad, confounded with Croup or *Cynanche Trachealis*, I have assigned a separate place; and I trust that the grounds of this will be perfectly intelligible to all experienced pathologists. It is almost the exclusive merit of English practitioners to have described and distinguished accurately the former from the latter disorder.

In the Therapeutic Department, I must say once for all, that I have been solicitous, rather to direct the attention of the student and practitioner to the judicious and seasonable employment of remedies and modes of treatment, the merits of which are well known and established,—whether old or of recent introduction,—than to lead him to repose confidence in new remedies which are still under probation.

I must not, however, exceed the legitimate limits of a Preface by specifying all the peculiarities of the present work, or assigning the reasons for each. They appear in the course of perusal; and I trust the reasons assigned will in general be found satisfactory.

A Formulary for the preparation and composition of the Medicines recommended, and a copious Index to the whole work, will be found at the end of the Second Volume.

EDINBURGH, 43, QUEEN STREET,
22d November 1836.

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ERRATA.

In page 48, line 17, *for* stomach *read* stomach.

— 462, — 6, *for* “corion” *read* “error.”

— 765, — 9, sulphate of zinc should be within brackets, thus []

— 924, — 1, *for* “Balmani” *read* “Balmain.”

ELEMENTS

OF THE

PRACTICE OF PHYSIC.

INTRODUCTION.

1. MEDICINE has been defined to be, the art of curing disease and prolonging life; and perhaps this definition is sufficiently comprehensive and accurate for many practical purposes. A more just view, however, is that which represents it as the art of preserving the health of the human body, or restoring it when impaired, by the employment of proper remedies. A still more comprehensive and philosophical idea is communicated by defining it, as the knowledge and proper application of those agents which may either maintain health and prevent the approach of sickliness, or remove it when it has taken place. In more express terms, medicine may be said to be the art of distinguishing, preventing, and curing diseases.

2. From Galen to Boerhaave, and from Boerhaave to Cullen and his followers, disease has been said to consist in some impaired action or disordered function of the animal body, by reason of which it is unable longer to exercise that function as in the state, or according to the laws, of health; or, in the words of Caldani, disease is nothing but derangement of function (*functio læsa*). In one sense this definition may be sufficiently accurate; but it is either too general to be always applicable, or it is too partial to be invariably true. If disease appear often to consist in derangement or interruption of function, it is still to be inquired what causes that derangement of function; and attentive consideration of individual examples of disease, will very often prove, that the derangement of function is connected with, and perhaps depends on, derangement of structure.

3. Every function of the animal body consists of one or more, sometimes several, individual but concurrent and successive actions (*actiones*); each action is performed by one or more organs constructed for the purpose; each organ consists of certain elementary tissues arranged in a certain form; and each elementary tissue not only possesses a definite arrangement of its minute particles or constituent atoms, but is endowed with certain physical and vital or physiological properties (*facultates*), by virtue of which it is enabled, with its particular arrangement and the mechanical form in which it is disposed, to concur in the accomplishment of the actions assigned to it. Every derangement of function, therefore, depends on the derangement of some of its constituent actions. It is doubtful whether any action can be deranged without some change in the properties of the elementary tissues of the organ. And it is still to be considered to what extent these properties can be impaired, disordered, or annihilated, without corresponding change in the elementary atoms which constitute the intimate structure of the organs.

4. To illustrate these general principles by particular examples, I may refer to any of the functions of the animal body,—for instance that of Circulation or Respiration. The function of circulation consists of the action of the heart, the elastic property and resisting power of the arteries, the reducent power of the veins, the unknown, or at least imperceptible action of the capillary vessels, and depends also on the alternate motions of the chest in respiration. The action of the heart is the result of its mechanical configuration, combined with the irritable and contractile properties of fleshy fibres. If it did not consist of hollow chambers it could not receive blood; if these hollow chambers did not consist of irritable fleshy fibres, they could not contract on their contents; if these chambers were not continuous with hollow pervious tubes, the blood could not be expelled; and if these tubes were not elastic and resistant as well as pervious, much of the power by which the blood moves from artery to artery would be diminished or lost. Though of the properties of the capillary vessels we possess little exact knowledge, we know enough, nevertheless, to justify the belief, that they possess some properties by means of which, whether denominated irritability, contractility, or tonicity, endosmose or exosmose, they contribute to the motion of the

blood through the substance of organs. Every lesion or disorder, therefore, of the function of circulation, necessarily implies impairment of the properties of one or all of these different parts; and these it is scarcely possible to suppose to exist for any time without inducing some change in the minute structure.

5. It may at least be regarded as well established, that if the properties of any texture or organ are impaired for any time, this change is followed by changes in structure. Thus, for instance, the capillary vessels of any texture, serous or mucous, never assume the condition denominated inflammation, without very speedily giving rise to new secretions, and deposits on their surface or in the substance of their tissues; and while I cannot attach any distinct idea to a lesion of the function of respiration, I can form a very satisfactory one of inflammation of the *pleura*, the bronchial membrane, or the pulmonic tissue. The blood-vessels of the periosteum or medullary membrane never continue that action long without destroying more or less of the substance of the bone itself.

6. For these reasons I conceive the propriety of the definition which represents disease as a disorder of function is questionable, because too partial and limited; and it becomes necessary to give a character which will apply with greater justice and accuracy to the object. This I think may be accomplished by defining disease to consist in that change in the properties or structure of any tissue or organ, which renders it unfit for the performance of its actions or functions according to the laws of the healthy frame. When disease consists in change of properties only (*ἡ δυνάμις*; *vires*; *facultates*), it is then denominated a *dynamic* affection or disorder. When it depends on change of structure, it is termed an *organic* lesion or disease. In the inaccurate and loose phraseology at present in use, the former are termed functional, the latter structural maladies.

7. It is probable that every disease at its commencement is a dynamic affection solely and entirely, and that it consists only of some preternatural change in the properties of some of the organic systems or tissues. As every sound action, however, which is the result of the continuance of the healthy properties, is a successive process, either for the maintenance of the sound state of the organ itself, or for some purpose necessary to the well-being of the system,—every change of properties amount-

ing to disease, constitutes a process or series of actions, tending with more or less certainty, and in a space of time longer or shorter, to derangement of the structure of the part, the properties of which are affected. Hence the terms morbid action, morbid process, which are often used as synonymous with disease.

8. It hence results, that in all instances, dynamic disorders of any of the tissues or organs of the animal body may be said to terminate in organic changes; and that all organic changes, not even excepting congenital malformations, may be traced to some previous derangement in the properties and actions of the tissue or organ in which they exist. Thus, inflammation of the *pleura* or *peritoneum* tends to the formation of albuminous effusion, which afterwards, under favourable circumstances, constitutes the new product, denominated false membrane or adhesion; inflammation of the pulmonic tissue produces induration and consolidation of the lungs; inflammation of the prostate gland produces induration of that body; and inflammation of the brain is followed by the conversion of more or less of that organ into a pulpy homogeneous mass, without trace of its original structure.

9. Conversely, after any change in the minute and intimate tissue of an organ has taken place, it reacts on the properties and action of that tissue and organ, and tends, in a degree more or less remarkable, to impair and pervert the former, and derange the latter, and thereby to disturb and disorder, more or less considerably, the functions which that organ is destined to perform. It hence results, that while dynamic disorder tends to the production of organic disease, the latter, on the other hand, produces dynamic irregularities and perversions. The changes now alluded to, nevertheless, take place so gradually in general, that the properties are perverted, and the actions are disordered only by slow and successive steps; and it is not until the texture of any part is in a very great degree and extent changed or destroyed, that the organ becomes totally unfit for its purposes in the animal economy. This principle is forcibly illustrated, as we shall see, in various diseases of the lungs, as *pneumonia* and its effects, *bronchitis* and its effects, tubercular deposition, and similar changes. The extent to which changes of structure proceed in these maladies is often very great, and would be astonishing, were it not so common.

10. Every disease, whether consisting of an assemblage of perverted or impaired properties, a process or train of disordered actions tending to organic changes, or of one or more changes already established, presents for observation two orders of objects. One is an assemblage of phenomena, either externally visible, or cognizable by sense, or felt by the patient, and which consist either of perverted or impaired sensations, disordered and irregular motions, or deranged, impeded, or interrupted functions. The other is the intimate, internal, and generally invisible state of some of the tissues or organs, which is the seat of the perverted properties, disordered actions, or alterations of structure. As the former class of phenomena is believed to arise from the latter, they are conceived to indicate their presence; and, therefore, while the latter assemblage constitutes the disease, the former are denominated its symptoms or signs; (*σημεία*; *signa*; *symptomata*). To ascertain the relative and invariable connection of these two orders of phenomena, is one of the most difficult and important duties of the physician; and upon the accuracy with which it is accomplished, depends not only the general perfection and efficiency of the art of healing, but the success of the methods of treating individual diseases. The first task of the practitioner in any given case or set of cases of disease, is to form from the attentive consideration of the external signs and symptoms, an idea as accurate as possible, of the nature and extent of the morbid action or actions in the tissues and organs of the living body. The science which proposes to supply this species of information, is denominated in general PATHOLOGY; (*παθος, λογος*) (*Theoria Morbi*), or the doctrine of morbid actions or diseases. This may seem rather an extended acceptation of the term; but I think it will appear from the subsequent observations and distinctions, that it is not more so than it is in truth, or ought to be.

11. Pathology is a science of great extent, and embraces several subdivisions. As disease may consist either in change or impairment of vital properties, in perverted or disturbed action, or in disordered or impeded functions, or in some preternatural alteration of structure, it is the object of pathology to investigate, describe, and distinguish, those different orders of deviation from the natural standard, to trace their

origin and progress, and to study their effects. This may be done in several different modes.

a. In the first place, the actions and functions may be observed in the living body, and their various deviations in different morbid states of particular organs, or of the system at large, may be carefully studied and compared with each other, and with the state of health. The assemblage of facts obtained in this manner regarding morbid states of the organic and animal functions, may be denominated *Pathological Physiology*. *

b. In the second place, from the knowledge which we possess of the natural conditions and chemical constitution of the different fluids of the animal body, whether secreted by the action of proper organs, or evacuated by art, with particular intentions, we may observe the changes which take place during disease, and study by the aid of physical and chemical experiment, to determine the nature of those changes. In this manner the physician observes changes in the blood or its parts, in the urine, in the bile, in the intestinal secretions and excretions, and even in the cutaneous discharges, and the air expired. This may be denominated *Pathological Chemistry*.

c. The information derived from the two sources now mentioned is, however, limited in its range, and is liable to be uncertain and erroneous in its results. By combining with them a third species of information, that derived from the careful inspection of the organs of the bodies of those cut off by disease, we obtain information, often regarding the effects, and occasionally regarding the nature of the morbid action. This department of medical research has been denominated *Morbid Anatomy*, and occasionally *Pathological Anatomy*.

12. Though this branch of inquiry is extremely important, and always indispensable for the purpose of forming correct pathological principles, its influence and importance must not be overrated. It is a vulgar error, the result of limited information, erroneous apprehension, and inaccurate modes of reasoning, to speak of Pathological Anatomy as the same as Pathology, and, in explaining the phenomena of morbid action, to substitute for the latter the facts disclosed by the former. The rational pathologist is aware that morbid anatomy can in general show only the effects of disease or morbid action, and not the intimate nature or essence of the morbid process itself.

* L. J. Begin, *Traité de la Physiologie Pathologique*, 1828.

But by connecting these effects with the symptoms exhibited by the living body, and with morbid changes observed in the actions and functions, and occasionally in the secretions, the pathological inquirer is enabled to form more just ideas of the nature of the morbid process than he could do by either of these methods alone, or without any of them at all. In establishing these principles he employs a process of reasoning and deduction, of which the general character is, from the effects, and their varieties and modifications to form inferences regarding the causes by which these effects are produced. In this process it is of the utmost importance that he should, in the *first* place, distinguish accurately between facts and inferences; *secondly*, that he should see that all the facts are well ascertained and are constant; and *thirdly*, that he should never confound effects with causes, or causes with effects.

13. By investigating disease in the manner now mentioned, and with the prescribed conditions, physicians have succeeded in a large proportion of instances, in discovering as much of the nature of diseases, as enables them to connect certain morbid processes with characteristic symptoms, to anticipate the course and effects of these processes, and to regulate the treatment accordingly.

14. The method of induction in this inquiry proceeds on the principle that no assemblage or train of symptoms can exist without an internal state of the tissues, or organs, or properties of these tissues or organs, different from the sound and natural one; and as this internal state is understood to give rise to the external disorders and palpable and visible or sensible symptoms, it is denominated their *cause*, or their *pathological cause*. Whenever the existence of this cause is obvious, appreciable, and palpable, either by the evidence of observation of the living body derived from analogous cases, or that of anatomical inspection and demonstration of the affected organs after death, it is quite the same with the disease itself. Thus the pathological cause of the symptoms of pleurisy or inflammation of the *pleura* is that state of the membrane in which, instead of being transparent, glistening, void of evident vessels, and insensible, it becomes dull and opaque, loses its glistening aspect, becomes more or less injected and vascular, more or less tender and painful, and begins to secrete a fluid which is quickly separated into two parts, one spontaneously coagulable,

and which adheres to the surface of the membrane, the other thin, watery, and permanently fluid, which is either absorbed, or occupies the most dependent part of the cavity of the membrane.

15. In the course of this inquiry it is found, that while morbid processes in certain tissues and organs of the animal body are attended with changes in the actions and functions of a more or less definite character,—in other instances, either remarkable changes are observed to take place without inducing those derangements of action and function which from analogous cases we are led to expect,—or very great and signal disorders of function take place in the living body without leaving in the organs, when inspected after death, any sensible or obvious trace of their action; or at least, if morbid appearances are found, no necessary or invariable connection between them and the phenomena of the disease can be established. In these instances the pathological cause or causes of the disease are unknown; and much obscurity hangs over the nature of such morbid processes. Such is the case with *asthma*, *hysteria*, *cholera*, *diabetes*, and some other diseases.

16. Though all morbid processes agree in the general character of differing from those which take place in health, they differ from each other in a variety of modes; all of which, however, may be referred to one or other of the following heads.

a. The nature of the process itself. The difference arising from this cause is often extremely obscure, and forms one of the most complicated questions in pathology. It requires the previous determination of the intimate nature of healthy action. In many instances, also, what has been regarded as a difference of action, is merely the same action taking place in a different tissue or set of vessels. In general, however, it is believed that the process of inflammation differs from that of fever,—that spasmodic motions or derangements in muscular action differ from both,—and that certain morbid processes consist in some perversion of secretion different from either of these actions. Thus the singular perversion of secretion and excretion in cholera and diabetes differs from inflammatory action and from spasm.

b. The nature of the tissue. This is a most fertile source of difference of diseases. The same morbid action produces

different effects, and gives rise to different symptoms in brain, gland, and muscle, or mucous membrane, serous membrane, and fibrous tissue. For more full information on this head I refer to my Elements of Pathological Anatomy.

c. The acute, subacute, or chronic nature of the morbid process. This produces remarkable differences in the characters of diseases. In general the symptoms are well marked and distinct in acute forms of morbid action, but obscure, equivocal, and sometimes latent in chronic forms of the process.

d. The simplicity or complication of the morbid action. It sometimes happens that not only two varieties of morbid action may co-exist in the same individual, and thereby modify each other, but the affections of two different tissues conjoined in the same organ may in a manner equally evident produce more or less difference from the simple affection of one tissue. Thus, independent of the simultaneous conjunction of such actions as those of fever and inflammation, congestion and inflammation, spasm and inflammation, gout and rheumatism, a serous membrane and its subserous tissue may become the seat of the same action; a mucous membrane and its subserous tissue may in like manner be simultaneously affected; a morbid action may affect at once mucous, submucous, muscular, and serous tissue, as in the alimentary canal. The symptomatic effects in all these cases differ much from those of the affection of the simple individual tissues.

17. From these circumstances, and more especially with a view to rational and efficient treatment, it has been found proper to distinguish diseases from each other, and to range together those which resemble each other, either in their morbid processes, or the external signs to which they give rise, and to separate them from those which differ in their characters. In several instances, however, in which the pathological characters of diseases are either imperfectly understood, or altogether unknown, it is impracticable to employ these characters; and it becomes indispensable for the physician to trust to the external symptoms, with such lights as observation, reflection, and casual occurrences may occasionally elicit. It must be remembered, also, that, in forming a judgment of each individual case, the physician cannot see the state of the internal organs and their component tissues, and he must

therefore estimate the state of these from those of the external symptoms, according to their similitude or dissimilitude to the symptoms presented by similar examples of disease in which the state of the internal organs was disclosed by inspection after death.

18. Since the physician, therefore, is compelled to judge of the nature of diseases as they occur in the human body, chiefly, if not entirely, by their external signs, the usual practice is to describe diseases according to the assemblage and train of external morbid phenomena which they produce in the appearance and feelings of the patient, in the perverted or irregular action of his organs, and in the general disorder of his functions. This department of practical medicine is denominated SEMEIOGRAPHY, (*Σημειον Γραφω.*) and occasionally NOSOGRAPHY, (*Νοσος morbus, Γραφω scribo.*)

19. In collecting and arranging the symptoms of any particular disease or family of diseases, it invariably results, that amidst a multifarious and often confused assemblage of uneasy or painful sensations, perverted or disordered actions, and impaired or disturbed functions, and which are the common attributes of many different forms of bad health,—a few prominent symptoms more invariable and uniform than the rest may be recognized. These symptoms, which are conceived to indicate accurately and positively the particular internal state of the organ or organs, and to distinguish it from every other with which it is liable to be confounded, are therefore denominated essential, *pathognomonic*, or *diagnostic* (*morbi symptomata*); their concurrence is said to constitute the *diagnosis* of the disease; and their application in practice, to distinguish diseases, is generally denominated *Diagnosis*.

20. As these essential signs are intimately and necessarily connected with the morbid action of each disease, they are always to be carefully distinguished from the general and accessory symptoms; (*symptomata generalia et symptomata non necessaria*). The general symptoms may be defined to be those marks of general disorder which are common to many morbid actions, in contradistinction to those which are peculiar to particular diseases. Thus quick tense pulse, unusual heat and dryness of the skin, thirst, general uneasiness, anxiety, restlessness, and general enfeeblement of the powers, are symptoms which are common to a numerous tribe of diseases,—all the febrile disorders, and most of the inflammatory affections.

Cough, difficult, accelerated, or laborious respiration, are symptoms which are common to affections of the chest; while fixed pain of the side, with inability to dilate that side of the chest, and more or less dulness on percussion, are proper to pleurisy.

21. In the course of several diseases, it often happens that, by reason of the duration, or the intensity of the morbid process, or its implication of other tissues from those which it had originally attacked, or, in short, from its producing morbid secretions or deposits, or changes in the structure of the affected organ, it presents a new set of symptoms which either complicate or supersede the first. Thus in any acute inflammatory disease, the intensity of the disorder of the circulation may be so great as to cause delirium, which is then not so much a symptom of the inflammatory disorder as of the symptomatic fever by which it is attended. In continued fever, retention of urine is not a symptom of the febrile disorder, but an effect of the impaired sensibility and contractility of the bladder, in consequence of the congestion of the brain and its membranes, or the spinal chord and its membranes. When bronchial inflammation and peripneumony proceed to effusion into the pulmonic tissue and air-cells, they not only prevent the access of air to the pulmonary vesicles, but they retard, by compressing the pulmonary capillaries, the transition of blood through the pulmonary artery and veins, and thus induce slow but fatal *asphyxia*. *Asphyxia*, however, is not a symptom of bronchial or pneumonic inflammation, but only of its effects. The stupor and coma with which such patients generally expire, are to be viewed in the same light as symptoms, not of the bronchial or pneumonic inflammation, but of the gradual interruption to the function of respiration. In like manner, when pleurisy proceeds to purulent or sero-purulent effusion, and causes swelling of the side, *orthopnoea*, oedematous swelling of the extremities, and hectic fever, all these changes by which the original symptoms of the pleurisy are superseded, are symptoms not of the pleurisy but of its effects. In short, all these secondary symptoms are symptoms of effects or symptoms of symptoms; (*symptomata symptomatum*).

22. Another class of symptoms, denominated accessory or supervening, *symptomata supervenientia*, vel *epigenomena* by the Greek physicians, have been mentioned by didactic writers, as Boerhaave, Gaubius, Caldani, &c. The name appears to have

been given at a time when little accurate knowledge of pathology and morbid actions individually was possessed; and I cannot distinguish them from those which I have now mentioned generally, as corresponding to the *symptomata effectus vel symptomatum* of the schools.

23. It is of the utmost importance for the physician to observe carefully and distinguish accurately these different classes of symptoms; and as this cannot be accomplished without very just and accurate ideas on pathology, general and special, it becomes impossible in practical application to disjoin the knowledge of morbid processes from those of their characteristic symptoms; and the whole object of the study of symptoms is to connect them with their appropriate morbid or pathological causes. The department of medical science to which this duty is assigned, is denominated SYMPTOMATOLOGY, or the Doctrine or Theory of Symptoms. When applied to explain the symptoms of individual diseases, it is usually said to be the *Ratio Symptomatum*, or the Theory of the Symptoms.

24. If we could always repose confidence in the accuracy of our observation, and in the constancy of the relations established between these diagnostic signs and the pathological state of the organs, that part of medicine which consists in recognizing and distinguishing diseases would then be a perfect art. From this high degree of perfection it is still remote. Though pathological research has assuredly succeeded in diminishing much the number of uncertainties and obscurities between symptoms and their causes, the physician has still daily occasion to remark the fallaciousness of some of his most usual diagnostic means; and the progress of various diseases affords examples of complication and obscurity, which make him feel forcibly the conjectural nature of his art, until symptoms so unequivocal have taken place, that diagnosis is no longer practically useful.

25. Pathology and Symptomatology are so closely and necessarily allied, that neither can properly exist alone, or be cultivated apart. Every fact and principle of pathology derives its value from the explanation which it affords of any symptom or set of symptoms; and it is totally impossible to establish a rational symptomatology without a collection of such pathological facts and principles. It is hence that it may be said that the great object of pathological inquiry is, to enable the phy-

sician to distinguish between essential or pathognomonic, and general, or common, or accessory symptoms; and, above all, to determine from the presence of each, the stage, degree, intensity, and effect of the morbid process, with the view to treatment.

Treatises on pathology have been written by Willis, Boerhaave, Haller, Ludwig, Gaubius, Nietzki, Caldani, Fanzago, Chomel, Bufalini, and Hartmann; and all those authors have found it requisite to consider at the same time the principles of symptomatology more or less minutely, and more or less accurately.

26. The formation of diseases, as now defined and described, is understood to depend on the presence or previous operation of certain circumstances, which are classed together under the general name of *Causes*. The department which undertakes to investigate the nature and operation of these agents, is denominated ETIOLOGY (*Aetilogia*; αιτια causa, λογος ratio; *causarum doctrina*); and that which considers the formation of diseases is denominated NOSOGENY (*Nosogenia*, νοσος morbus, γενος origo, ortus.)

27. The name of Cause is often very vaguely and erroneously applied in speaking of disease; and perhaps it is one of the most difficult inquiries to determine in every case the true and genuine cause of any given morbid process. In general, however, the name of Cause is given to every agent which is observed to produce, in the properties or actions of the animal tissues and organs, any change so considerable as to make them deviate widely from the standard of health.

Though several modes of distinguishing and arranging the circumstances believed to operate as causes of disease have been followed, the one in most general use is that which distinguishes them into Remote and Proximate.

28. Of these two kinds of causes, definitions in general too abstract and metaphysical have been given; and pathological authors have been too solicitous in their desire to avoid assigning undue influence to either class, to designate them by characters so general, that it is difficult to attach to them any definite idea.

29. It must be admitted, in the *first* place, that observation shows, that scarcely any individual agent is alone adequate to produce disease in the human body; and though atmospherical

vicissitudes, excesses in food and drink, or the indulgence of any of the appetites or passions, undoubtedly enfeeble the system and impair its powers, they do not alone invariably induce diseased action. It is only under certain circumstances that they are followed by disease; and then it is generally observed that the system has been previously not in a healthy state, or, in other words, has been predisposed to disease.

30. All those circumstances which are observed to produce in animal bodies sickness or morbid action, are comprehended under the general name of Remote Causes. These are distinguished into predisposing causes (*causæ prædisponentes*; *c. proegumenæ*), or those which induce a disposition to disease, and exciting or occasional causes (*occasiones, causæ procatarecticæ*), or those which, when the disposition is already established, rouse it to action, and give rise to actual disease.

31. Predisposing causes correspond with those denominated *internal*, in so far as these must exist in the person or organs of the individual, in order to constitute that condition to which physicians give the name of predisposition. On this condition little precise information is possessed; and it has been the subject of a considerable proportion of rather vague and fanciful speculation. I think, nevertheless, that, from what we know regarding the mode in which diseases attack the human body, the kind of persons most usually attacked, and the facts disclosed by dissection of those destroyed by acute diseases, which others have resisted, the following aphorisms may be established.

a. Predisposition to disease consists in more or less diminution of the energy of the capillary circulation, in consequence of which the frame becomes less able than in the vigorous, to resist the injurious impressions of various morbid agents; for instance, atmospherical vicissitudes, miasmatic emanations, excesses in food and drink, &c.

b. This diminished energy of the capillary circulation is indicated by various derangements of the circulation of particular organs, on the application of causes which in robust health are followed by no injurious change. Thus catarrh, dyspeptic symptoms, headach, diarrhœa, and rheumatic pains, occasionally in certain classes of persons succeed exposure to cold, which is not followed in other persons by such effects. In such per-

sons the skin is dry and hard, or perspires too easily, and the mucous surfaces are in like manner disordered.

c. Though in some instances this impaired energy of the capillary system is an affection entirely dynamic, or one of mere properties exclusively, it may often be traced to some dynamic or organic change, sometimes very slight in some important organ. Thus a bronchial membrane of unusual susceptibility; a gastro-enteric membrane more irritable than is proper; an indurated state of the lung; a hypertrophied state of a ventricle of the heart; a disorder, more or less considerable, of the acinoid texture of the liver or kidney, though not giving rise to very manifest or permanent disorder of the functions, are all conditions which are found in the persons of those who have presented this impaired energy of the capillary system.

32. From a great variety of morbid inspections I have satisfied myself that the persons most predisposed to attacks of disease present one or more of these changes. I do not pretend to assign the mode in which these changes operate in giving rise to this impaired energy of the capillary system. But if I were to indulge in conjectural reasoning, I would say that when the vessels or tissue of any separate organ are so changed as to affect the capillary circulation in that organ, the local derangement gives rise to more or less general derangement of the capillary system at large, in consequence of which the frame of the individual is less able than in robust health, to resist the injurious operation of external or physical agents.

33. What is the cause of this impaired energy of the capillary system when merely dynamic, is not easily determined. In some, perhaps most instances, it depends on original formation. But there is little reason to doubt that it may be augmented very powerfully by improper management of the functions in early life. Thus excesses of various kinds, bad or innutritious food, exposure to cold, to atmospherical vicissitudes and similar causes, or mechanical injuries, will no doubt at length impair the energy both of the capillary system at large, and of that of individual organs. Causes of this kind indeed seem often inadequate alone to induce this impaired energy.

34. Under this head it may be proper to speak of those states of the human body which physicians have denominated morbid dispositions; (*diatheses morbosæ*).

The term *Diathesis* has been used a great deal too vaguely

and extensively to designate often some unknown, impalpable, and undefined state of the system, the existence of which is assumed in order to explain the characteristic tendency of morbid action betraying itself by repeated and manifold indications. Thus it is common to speak of a phlogistic or inflammatory *diathesis*, a strumous *diathesis*, a catarrhal *diathesis*, a rheumatic, a gouty, or a dropsical *diathesis*, and even a scirrhus or cancerous *diathesis*;—several of which are probably only different names for the same general tendency, and neither of which have been very well defined. With the view of communicating some more precise ideas on this subject, I shall mention only four morbid *diatheses*, the phlogistic or inflammatory, the strumous, the rheumatic, and the gouty *diathesis*.

35. The term phlogistic *diathesis* is employed to designate that state of the human body, in which, though there is supposed to be no actual inflammatory disease present in any organ or tissue, there is nevertheless a tendency or readiness of the system to assume the inflammatory process, which indeed takes place on the application of any exciting cause to any particular organ. Of the existence of this condition of the system we have no very distinct proof; but in general it has been supposed to precede attacks of inflammatory disease. Of its exact nature we have as little satisfactory information; but it must consist in some state either of the capillary system or of the sanguiferous system at large, perhaps of the state of the blood itself. In some instances it appears to be the same with the general symptomatic fever of chronic inflammation in some organs; and I suspect that what has been denominated the phlogistic *diathesis* is in many instances the general disturbance occasioned by chronic inflammation of a lung or liver, disease of the heart, or disease of the kidney. Thus, I have repeatedly seen in persons of external healthy appearance acute attacks of illness requiring active treatment; and in whom, upon inquiry, it appeared there was chronic and latent inflammation of the bronchial membrane or substance of the lungs, disease of the kidney, producing more or less albuminous urine, or that general state of disorder in which the *serum* of the blood becomes turbid and opalescent from the presence of oil. It may be stated in a general manner, that, in the phlogistic *diathesis*, the process of nutritious deposition is perverted and suspended, and that the materials which should be employed

in the nutrition of the different tissues and organs are either expended in morbid action, or are converted into morbid secretions.

36. The term Strumous *diathesis* or scrofulous habit (*habitus strumousus*) is used not less generally, and perhaps more extensively, than that of phlogistic *diathesis*; and it is often extremely difficult to attach to it as in ordinary employment any precise idea. It is manifest that the ordinary characters of external *struma* do not in this instance act as a guide; for, on the one hand, in many persons in whom these characters are distinct, no strumous disease takes place, and, on the other, diseases ascribed to the strumous habit take place in persons in whom the marks alluded to cannot be recognized. Nor is it possible to admit the exclusive influence of the lymphatic system in the formation of this *diathesis*; for to that system its effects are not confined. When we consider the subjects, however, in whom strumous diseases take place, and the multifarious forms which they assume, it may be inferred that the strumous *diathesis* consists in a peculiarly feeble, inert, and relaxed state of the whole capillary vessels, in which they either lose the power of depositing firm solid particles in the different tissues, or in which they are liable to deposit particles of albuminous matter void of organization, and consequently incapable of forming part of the animal tissues. In the tissues of strumous subjects the vessels are lax, large, rather numerous, with slight powers of contraction, very liable to become preternaturally distended, and to assume morbid action. These vessels are, in short, liable to an aberration of action, which may be denominated *Paratrophia* or misnutrition.

37. The strumous or scrofulous *diathesis* is believed to be the internal cause or disposition which, with or without the application of exciting causes, gives rise to all those diseases which are denominated scrofulous. Though these diseases may occur in any texture or organ of the body, they are most liable to take place in those in which the circulation is naturally languid, and the vessels are perhaps inert,—for instance, synovial membrane, periosteum, and bone,—or in which the circulation is slow, with a complex arrangement of vessels, for example, the different secretory and lymphatic glands.

38. Of the rheumatic *diathesis*, it is merely requisite to say, that it is a condition of the system hypothetically assumed to

exist in rheumatic disorders, and which is perhaps not essentially different from the phlogistic *diathesis*, and occasionally appears to correspond with the strumous.

39. The gouty or arthritic *diathesis* is in general supposed to be very different in this respect, that, though hereditary, and at the same time acquirable by improper modes of living, it may lurk in the system, and only betray its existence by the periodical local inflammation to which it gives rise. From the observations of Whytt, Cullen, and Parry, however, it is impossible to doubt that a general morbid state of the circulation, and affecting more or less directly the circulation of particular organs, as that of the liver, kidneys, or even of the brain and spinal chord, exists in the persons of those liable to gouty attacks. This morbid state is certainly connected with plethora, and also with irregular determination or congestion; but it may be doubted whether these are more than effects of a previously impaired energy of the capillary system, induced by long-continued habits of intemperance and indolence.

40. In these four examples of internal causes of disease or dispositions inherent in the animal body, the physician has reason to observe the influence of the continued or repeated operation of causes external to the frame, or ordinary physical causes; and perhaps if he narrowly inspected, most of the internal or predisposing causes may be traced either to some original delicacy in original formation, or some unhealthy or perverted action, induced by the long-continued or repeated operation of external agents on the organs of the body. This will appear more clearly from what immediately follows.

41. To the head of Occasional Causes of Disease, physicians refer all those circumstances and accidents, the operation of which upon the frame is followed more or less directly by the establishment of definite morbid action. Of this kind are miasmatic *effluvia*, cold and moisture, applied in particular modes, excessive solar or atmospherical heat, atmospherical vicissitudes, the emanations or *effluvia* of human beings, the application of specific contagious principles, excesses in eating and drinking, the use of innutritious or corrupted articles of food and drink, sensual indulgences of any kind, especially if carried to excess, and inordinate emotions and passions. To these some have added astral influence, or that of the stars, sol-lunar influence, or that of the sun and moon, electric, magnetic, or electro-

magnetic influence, and some others equally uncertain in their existence and effects. Without pretending to deny the existence of such causes, it is sufficient reason for excluding them from the present list, that their operation is very problematical, and cannot be demonstrated.

42. Every occasional or external cause may, by habitual, continued, or repeated operation, give rise to effects which constitute morbid predisposition, and hence may become at once an occasional, exciting, or external cause, and a predisposing or internal cause. The best examples of this combination are presented by the effects of terrestrial or miasmatic emanations of marshy, insalubrious, and malarial districts, the effects of residence in tropical and hot climates, where the solar heat is intense, and the effects of the habitual use of spirituous, vinous, and fermented liquors.

a. In the first place, there are many individuals resident in marshy and malarial districts who, though not attacked by distinct ague, become the subjects of general impaired health, showing itself in imperfect digestion, flatulence, diarrhoea, loss of muscular strength, a sallow look, susceptibility to external impressions of cold, with heat, night-sweats, loaded turbid urine, and an unhealthy state of the cutaneous and mucous circulation, without manifest local disease at first. On removal from such a district, all these disorders subside and disappear; and the individual seems to be restored to health. If, however, he continues in it, on the application of any extraordinary external cause, such as getting thoroughly wetted, being much fatigued, a debauch, or sometimes without any manifest occasion, he may be at once attacked with ague, remittent fever, dysentery, or even ardent fever, with general and local disorganization. Such results are not unfrequent in the district of the Lower or Maritime Alps, as in Martigues and Aigues Mortes in France, in the Roman territory and Maremma of Italy, in the Carolinas and Virginia in North America, and similar situations.

b. In hot and tropical regions the direct solar and the atmospheric heat, long-continued, seems, by the profuse perspiration which it causes, and the enfeeblement of the energy of the stomach and capillary system, to impair remarkably the general powers of all the tissues, to derange the circulation of the capillary vessels of the alimentary canal, and its great ap-

pendage, the circulation of the portal vein, and in this manner to induce a state of dynamic disorder, ill calculated to resist the operation of physical and external agents generally. In such states of the system, therefore, the direct application of heat, or sudden transition from heat to cold, is often followed by disorder so considerable as to extinguish life in a short time, by changing either the circulation of the brain as in *siriasis* or *coup de soleil*, or that of the alimentary canal, as in dysentery and cholera.

c. The slow operation of vinous and spirituous stimulants is not less pernicious. Independent of the repeated over-excitement to which the gastric and duodenal mucous membrane and the vascular system generally are thus habituated, these fluids, by inducing a partial coagulation of all the albuminous articles of food, render them more indigestible than they would otherwise be. It may be indeed said that these substances are coagulated by the gastric fluid, and that, consequently, such an effect is not inconsistent with digestion. It would not indeed be so, were it induced by the proper agent; but effected by one which at the same time excites inordinately and unnaturally the gastro-duodenal tissues, it eventually impairs their powers, and that of the system at large. The effects of a debauch extraordinary in such systems, and the effects of morbid agents generally, are more than usually impressive. It is in such subjects that the capillary system exhibits that impaired tone and want of open vigorous action and reaction, which either constitutes, or gives rise to the formation of, congestion.

43. The Proximate Cause of Disease (*Causa Proxima*; *Causa Continens*), has been in general represented to be the result or product of the concurrence of the remote causes in the economy and its organs. In a manner rather too abstract, it has been metaphysically defined to be that which, when present, constitutes the disease, when removed removes, and when changed also modifies the disease. As it is understood, whatever it be, to constitute the disease, it is therefore often denominated the constituent or essential cause (*Causa Continens*.) As it must, according to this definition, always be seated in the body of the patient, and also give rise to the essential symptoms, it is manifest that it is the same as the disease itself, or at least as its pathological cause, wherever that is ascertained. The identity, therefore, of the disease as a pathological process, and its proxi-

mate cause, was admitted by Boerhaave himself,* and also by Gaubius† and Caldani.‡ To avoid misconception, therefore, and ambiguity, of which this metaphysical abstraction has been too often a fertile source, it would be best to banish this term entirely from the usage of physicians, and to substitute in its place the term *pathological cause*, or simply *pathological character* of the disease, which would then have a definite signification.

44. It has been the practice among pathologists to imagine, if not to maintain, the existence of a state or states of the animal body produced by the combined operation of the predisponent and occasional causes,—the offspring of these causes as it were, and the generating principles of the disease or diseases. To these, therefore, they have applied the name of *semina* and *seminia*, or seminal principles of disease, (Gaubius, Caldani,) &c. It must be manifest, that if these denominations mean any thing at all, it is hardly possible to distinguish them from the incipient or morbid state, termed *diathesis*; and, therefore, that it is unnecessary to admit their separate existence. It is, at all events, pretty evident that their existence is either entirely hypothetical, and that the name is applied to them, in order to enable us to form, by comparison with sensible and obvious objects, some idea of their nature,—or that they are so far beyond the reach of sensible demonstration that they can be of no use in establishing the principles of a science requiring practical application.

45. The only legitimate mode of forming a correct theory of the formation of diseases (*Nosogenia*), is to study the operation of remote causes generally, to observe their effects on the human body and its organs, and to endeavour to trace the connection between the operation of these causes and the morbid changes induced in the course of various diseases. The introduction of seminal principles of diseased action may aid our conceptions, and render processes, of which we can

* “Ergo Causa Proxima est ipse morbus.” Praelectiones Acad. ed. Haller, vi. 737.

† “Imo hæc causa totam morbi, effectus sui, naturam constituit, ideoque ab hoc reipsa vix discrepat.” Institut. Patholog. 67.

‡ “Causa autem proxima appellatur illa quæ totum morbum ita constituit, ut et morbus et causa inter se differre non videantur.” Institut. Patholog. 161.
“Nimirum causam morbi proximam sæpe idem fere esse cum morbo ipso.” Ibid. 162.

form a very obscure and confused idea only, a little more tangible, by likening them to processes which, if not more intelligible, are more obvious in some of their stages. But it may be doubted whether by this method any real addition is made to the stock of actual knowledge.

46. With the view of communicating just ideas of the resemblances and affinities, as well as the differences of diseases, and exhibiting correct views of their mutual relations, it is usual to distribute diseases in a certain method or order.

Observation of diseases as they take place in the human body, shows that while many of them resemble each other, others differ both in pathological characters and symptoms, but in a manner so uniform, that the similitude or difference may be always traced to some definite pathological cause. This regularity and conformity had struck Sydenham so forcibly, that he expressed his conviction, that it was at once expedient and practicable to arrange diseases in definite species,—by a method as accurate, and with the same facility, as naturalists arrange plants and animals. The general principle on which Sydenham proceeded is stated in the following terms.—“*Expedit ut morbi omnes ad definitas ac certas species revocentur, eadem prorsus diligentia ac ακριβεια, qua id factum videmus a botanicis scriptoribus in suis phytologiis. Quippe reperiuntur morbi qui sub eodem genere ac nomenclatura redacti, ac quoad nonnulla symptomata sibi invicem consimiles, tamen et natura inter se discreti diversum etiam medicandi modum postulant.*” *

Sydenham impressed also, in this method of arranging diseases, the necessity of deriving characters from phenomena or matters of fact, and not from matters of opinion;—a rule which cannot be too strictly enforced, and which, therefore, requires that the physician must, in those cases in which pathological characters are uncertain or unknown, have recourse merely to symptomatic characters.

47. The plan recommended by Sydenham was first carried into effect in 1730 by Sauvages, who published in 1731 the first specimen of Nosological Arrangement, under the name of *Classes of Diseases*. This small treatise was afterwards expanded, and, with various rectifications and additions, appeared

* Opera Universa; Præfatio. Lond. 1715.

in 1763 in a more complete form, exhibiting not only classes, but *genera*, *species*, and varieties of diseases.

The department of medicine thus created, which has been denominated NOSOLOGY (*Nóσos morbus, Λόγος ratio*), has been since cultivated with different degrees of assiduity and success by Sagar, Vögel, Linnæus, Cullen, Macbride, Swediaur, Young, Pinel, and Mason Good. While Sauvages has the undoubted merit of first sketching the plan, and exhibiting the arrangement in a degree of wonderful perfection, considering that it was a first attempt, it is impossible to deny that Cullen has effected more important and real improvements, than all the other nosologists, who have attempted it; and scarcely those of Young, Pinel, and Mason Good, can be regarded in any other light than as slight and partial improvements on the method and distinctions of Cullen.

48. The general principle of Nosological distinction is to arrange Diseases into certain similar tribes or assemblages, according to their resemblances and their dissimilarities, in imitation of the arrangements of Natural History. The largest and most comprehensive assemblages of diseases are denominated Classes; those next in point of number and extent are denominated Orders; the next constitute Tribes or Families; the next Genera; the next Species and Sub-species; and the last Varieties or Modifications.

In distributing diseases in this manner, it is necessary to distinguish each Class, Order, Family, Genus, and Species, by a certain number of characters, by which it may be known from those which most closely resemble it, and to designate each thus distinguished by an appropriate character and appellation. Nosology may therefore be distinguished into two divisions; *Nosotaxy*, or the Distribution and Classification of Diseases, and *Nosonomy*, or the Nomenclature of Diseases.

49. The nosological characters of diseases have been derived from various circumstances, most generally from their symptoms, sometimes from their pathological nature, and sometimes from their remote causes. The latter method is the most uncertain of all, and ought seldom or never to be used; since the same remote cause may give rise to very different morbid states in the living body. The distinctions of Sauvages were generally derived from symptomatic and pathological characters taken together; often from mere external symptoms. Those of Cul-

len were sometimes from essential symptoms, but more frequently from pathological characters, and from these and pathognomonic symptoms taken together. The basis of the arrangement of Mason Good is physiological; and the characters of the different classes, orders, families, and genera, are derived from symptoms.

50. There is no doubt, that, if we always knew the pathological causes of diseases, and the exact relation between these causes and the external signs, these would assuredly form the best foundation for nosological distinctions. From the imperfect state of pathological knowledge, however, this method is not applicable to all diseases; and we are therefore, in the present state of knowledge, compelled to adopt it only partially. In the following work I propose to adopt, as the basis of classific distinction, the pathological nature of the different morbid processes, and to subdivide these as nearly as may be, according to the anatomical arrangement of the textures and organs of the animal body.

On this principle I shall consider in the following order, Fevers, Inflammatory Diseases, Hemorrhagic Diseases, Dropsical Disorders, Disorders affecting the properties of many organs at once, not always in a very intelligible manner, Mental Disorders, and lastly, Organic Changes, not referable to either of these heads. This I submit, not as a perfect arrangement, but as one which enables me to refer to its appropriate family each disease requiring consideration. The details will appear more fully in the course of the work.

51. The great purpose of all investigations into the nature and causes of diseases, is to enable the physician to devise a rational and effectual method of prevention and treatment; in other words, to preserve health, to prevent the formation of disease, and when established, to effect its removal. This department, therefore, which may be distinguished by the general name of Therapeutics (*Therapeia*), comprehends two great divisions;—one relating to the means of maintaining health and preventing disease (*Prophylaxis*; *Prophylactice*;) the other Therapeutics (*Therapeia*; *Methodus Medendi*), properly so called.

52. The Prophylactic or Preventive department embraces two subdivisions, one relating to the general rules established by physiology, etiology, and pathology, for the preservation of health (*Hygiene*, *ὕγιεινη*), by all those means which correct

knowledge of the functions and the operation and tendency of deranging causes is calculated to supply, and comprehends all those rules regarding diet, regimen, clothing, exercise, physical training, and moral education, mode of life, and the regulation of the secretions and excretions, which are necessary to the continuance of good health. To the second head may be referred all those measures either of precaution, prevention, or rectification, which are adopted to counteract the operation of deleterious principles or morbid agents generally on the human frame. This division, therefore, corresponds in many respects in its objects with those of Medical Police.

53. When disease is already established, measures both additional in number, and somewhat different in kind, become requisite, in order to effect its removal, to moderate its violence, or to counteract its effects. To this department the name of Therapeutics or the Curative method (*Methodus Medendi*), is more properly and strictly applicable. It consists of two subdivisions,—General Therapeutics (*Therapeia generalis*), or the consideration of the general principles on which the removal of morbid action is to be effected; and Special Therapeutics (*Therapeia specialis*), or the mode of applying these general principles to the treatment of individual diseases.

54. The former department is generally regarded as an appendage to a course of physiology or of pathology, and has for a long time constituted part of the course of lectures delivered in the University of Edinburgh on the Institutions of Medicine. Latterly, I believe, it has been gradually tending towards the course of *Materia Medica*.

55. Special Therapeutics, or the consideration of the principles required in the treatment of individual diseases, constitutes one of the most important branches of the Practice of Medicine; since, from the illustrations of pathology, general and particular, it undertakes to trace the course and kind of measures requisite to subdue morbid action, and to counteract its effects.

56. In devising plans for the extinction or removal of any class or kind of morbid actions, it is believed, that while the physician, by an accurate consideration of the symptoms and the particular morbid actions which they indicate, forms some judgment of the particular kind, stage, and degree of these actions, he also, either from reason or experience, forms some judgment of the means by which these actions are most likely

to be moderated, restrained, and subdued, and the patient is to be restored to health. The circumstances from which the physician forms this judgment are denominated indicating circumstances (*res indicantes; signa indicantia*); the object or purpose pointed out is the thing indicated (*res indicata; indicatum*), or simply, though rather erroneously, the indication; and the judgment itself is denominated the sanative or therapeutic intention (*consilium medendi; indicatio curatoria*). In the fulfilment of those indications, consists the treatment of any given disorder; and the means or agents by which they are accomplished are denominated remedies (*remedia, auxilia*).

57. If in all instances the pathological cause or causes were perfectly known, and if at the same time we were perfectly acquainted with agents which could operate on these causes directly and efficiently, and remove them entirely, the principles of therapeutics would rest on a sure and immutable foundation, the curative indications would be simply to remove the pathological cause or causes of the disease, and the healing art would be reduced to great certainty and precision. This perfection, however, pathology has not yet acquired; and the principal lesson which it has taught, is that what is named *cure*, consists not in the positive removal or extinction of a morbid process by direct means, but in the gradual subsidence of the morbid action under a favourable combination of circumstances, and the restoration of the action of health. The cure of disease by direct means is indeed very rarely practicable; and though pathological causes are known, our means do not operate on them; while in the diseases in which the causes are unknown, curative indications must be derived from symptoms. When healthy properties are impaired, we know no agent by which they can be directly restored; when vital action is perverted or deranged, we possess no means of immediately rectifying it, but must be satisfied with using those means under which it is most likely to rectify itself; and when morbid processes are established, they pursue a certain course, and tend to a particular termination; and all that the physician can do, is to moderate and restrain the violence of the process so much, as to prevent it from injuring important and essential organs.

It hence results, that it is impracticable, in the treatment of all diseases, to found curative indications on the pathological

causes, or to employ in the fulfilment of those indications, remedies which could operate on these causes.

58. Etiology, however, shows, that, by removing remote causes, and counteracting their operation, the energy and intensity of morbid action is always abated. These furnish an important class of indications, which are indirectly, but powerfully, curative by their preventive operation (*curatio præservatoria*). These comprehend dietetic measures, regimen, clothing, avoiding exposure to cold or moisture or sudden atmospheric vicissitudes, rest, removal of *stimuli* or irritations, regulation of the intellectual powers and moral qualities, and sometimes the management of the secretions and excretions. Observation and experience show, that the organs and tissues of the animal body possess certain powers, by which they tend to resist the operation of these causes. These powers, which have been classed by the schools under the general and rather vague name of conservative properties (*vires conservatrices*), and occasionally medical properties (*vires medicatrices*), or the still more comprehensive abstraction of *Nature*, are doubtless the same as the original sound properties inherent in the different tissues, connected with, though not always dependent on, their organic constitution, but compelled, by the operation of the remote causes, to assume morbid and unnatural action. The knowledge of these properties, of the laws by which they are regulated, and of the extent of their influence, furnishes the most useful and important class of indications which are more directly curative than any others. Thus, in inflammatory diseases, though we cannot by any means operate directly on the process, so as to subdue it in the affected organ or organs, experience teaches us, that, if we diminish the materials whence the process derives its intensity,—if we empty the overloaded and distended vessels, and allow them to contract, and, by other appropriate means, remove the phlogistic diathesis of the system at large, the vessels of the affected texture are in general adequate to complete the cure. When emptied of part of their contents they become less tense, and, gradually recovering their natural tone, contract on the residue of their contents, and re-establish the natural circulation of the part. In hemorrhagic diseases, in like manner, though we cannot apply to the vessels of the brain, the lungs, or the intestinal tube, the fancied styptics of the ancient physicians, by depletory measures, proper regimen, and cooling saline medicines,

we place the vessels in the condition of contracting themselves, and thus returning to their natural and healthy state. These present perhaps the nearest approaches to curative indications, or those founded on pathological or proximate causes. Treatment suggested by this method is denominated *rational* (*methodus medendi rationalis*), not because it is speculative, but because it is the result of reasoning derived from experience and observation combined.

59. In many instances in which little or nothing of the pathological nature of diseases is known, the physician judges from the symptoms and their intensity, of the intensity of the morbid action, and applies analogically, remedial measures which are known in similar cases to moderate the violence, abridge the duration, or favour the removal of the disease. Thus it is known by experience, that in asthma emetics relieve the difficulty of breathing, and promote the occurrence of expectoration, which favours the disappearance of the distressing symptoms. In cholera, calomel and opium, or sometimes the latter alone, are known by experience to moderate the vomiting and purging, and favour the removal of the disorder. In diabetes opium and lime-water, or alum, with animal diet, are found to diminish the profuse discharge of urine, and occasionally to disguise, if not to remove, its saccharine qualities. In circumstances of this nature the indications are palliative and symptomatic; and the treatment is empirical (*methodus medendi empirica*).

The term empirical does not imply in this case any thing improper in the practitioner, but simply states the imperfection of the science of medicine.

60. In some diseases in which the morbid process is either imperfectly known, or, though known, is not susceptible of receiving any impression from modes of treatment and remedies, and in all diseases, whether their pathological causes be known or not, the attention of the patient and the physician are forcibly attracted by a number of uneasy sensations, such as excessive thirst, sickness, loss of appetite, or a preternaturally ravenous craving for food, pain in various parts, or disordered functions, such as cough, difficult breathing, and excessive evacuations, all of which require to be alleviated and moderated. As all these uneasy sensations and deranged actions are mere symptomatic effects, no remedy applied to them can be expected to operate on the pathological cause by which they

are produced. While, therefore, the comfort of the patient requires that means of relief be afforded, the physician should not allow the apparent urgency of these symptoms to cause him to overlook the primary morbid state from which they spring. In these circumstances, therefore, while he studies to fulfil symptomatic indications by palliative treatment, he always endeavours to form, from the course and combination of the whole of the symptoms, such a judgment of the internal state of his patient, as may enable him to form a general curative indication, and to devise and conduct a systematic plan of treatment, by which that curative indication may be fulfilled. Numerous examples of this occur in the course of the treatment of diseases; but in none more remarkably, perhaps, than in fevers, in which, from the general and comprehensive nature of the morbid action, its symptoms appear in many different organs and regions of the human body.

61. Experience and observation of the sick has shown, that, though in many instances no individual agent is adequate to effect a cure, the uneasy sensations of the patient, and the general symptoms of the disorder, are liable to undergo a degree of alleviation in certain circumstances, and of aggravation in others. The means which are found to give relief have been distinguished by the general name of *juvantia*; those from which aggravation has been observed to follow have been named *lædientia*. It is requisite in all instances for the physician to avail himself of the advantages resulting from the former, and to prevent the latter from operating on the patient.

62. In many instances attention to the *juvantia* and the *lædientia* is so much more necessary, that we have no means of arresting the course of a morbid process, and that the duty of the physician is then limited to the task of carrying the patient through his disease with as little suffering as possible, and without allowing the morbid action to produce injurious impressions on essential organs. This is applicable to many acute diseases, several of the eruptive cutaneous disorders, and several chronic complaints.

63. In the selection and employment of means to fulfil particular indications, it occasionally happens, that the remedy which is demanded or indicated to accomplish a certain object, may appear, and may actually prove, to aggravate some other condi-

tion or set of symptoms in the same patient. Thus, though in a particular local inflammation we may be satisfied that depletion, general and local, may be necessary to subdue the action and alleviate the symptoms, the state of the patient generally, and of the organ particularly, may be such as to forbid the use of these measures. In such circumstances, they are said to be *contraindicated*. Good examples of this present themselves in pleurisy, consequent on excavation of pulmonary tubercles, and *peritonitis* resulting from perforation of the intestinal tube, in which blood-letting, general and local, however beneficial, rarely produces much relief, or, in short, is useful at all. In these cases of contraindication, remedies of a different character, such as anodynes and narcotics, are required.

64. When in two opposite morbid states the same remedy is supposed to be indicated, the judgment is termed a co-indication. This, however, is a distinction which was more spoken of when pathology was little understood than at present. Blood-letting, which was believed to be contraindicated in dropsy, was believed to be co-indicated when the dropsy was combined with hemorrhage.

65. Lastly, in some incurable diseases, in which all human interference appears to be useless or injurious, the indications are, by the general consent of intelligent and candid physicians, confined to the mere alleviation of pain, soothing the sufferings of the patient, and depriving the agonies of the last moments of their bitterest pangs. On the means of accomplishing this object, which has been denominated by the general name of *Euthanasia*, some very judicious observations are made by Dr Ferriar.

Medicine, therefore, from the foregoing sketch, consists of the following divisions.

ETIOLOGY, NOSOGENY, NOSOLOGY, SEMEIOGRAPHY, or NOSOGRAPHY, PATHOLOGY, and THERAPEUTICS.

BOOK I.

FEVERS.

CHAPTER I.

A Vindictory Schedule concerning the New Cure of Fevers, by Andrew Brown, M. D. Edin. 12mo, 1691.—Observations on Epidemic Diseases, by Joseph Rogers. Dublin, 1734.—Rational Methods and Medical Practice of Curing Fevers, by Theophilus Lobb. Lond. 1734–5.—Twelve Commentaries on Fever, by Thomas Glass, translated by N. Peters. 8vo, Lond. 1752.—On Fevers, Consumption, the Pulse and Bleeding, by John Hawkrigde. 1764–5.—On Fevers, by Lionel Chalmers. 8vo, Lond. 1768.—On Fevers, by John Gibson. 8vo. Lond. 1769.—Observations on the Nature and Cure of Fevers, by Wm. Grant, M. D. 2d ed. 2 vols. Lond. 1772.—Observations on the Prevailing Diseases of Great Britain, by John Millar. Lond. 1770.—Essays on Fevers, Dropsies, Diseases of the Liver, &c. by Daniel Lysons. Bath, 1772.—Dissertations on Fever, by George Fordyce, M. D. 4 vols. 8vo, Lond. 1794–1802.—A Treatise on Febrile Diseases, by Alex. Wilson Philip, M. D. 1st ed. 4 vols. 1799–1804, 3d, 2 vols. 1813.—Essays on the Nature of Fever, by Alex. Wilson Philip, M. D. 8vo, Worcester, 1807.—Comparative View of the Theories and Practice of Cullen, Brown, and Darwin, in Fever, by H. X. Baeta. Lond. 1800.—Researches, Anatomical and Practical, concerning Fever, as connected with Inflammation, by Thos. Beddoes, M. D. Lond. 1807.—An Inquiry into the Seat and Nature of Fever, as deducible, &c. by Henry Clutterbuck, M. D. Lond. 1807. 2d edit. 1825.—Reflections on Fevers, by Robert Calvert. 8vo. Lond. 1815.—An Outline of the History and Cure of Fever, Endemic and Contagious, &c. by Robert Jackson, M. D. 1808.—A Sketch of the History and Cure of Febrile Diseases, &c., by Robert Jackson, M. D. Stockton, 1817.

THE term *Fever* is employed in a general sense to denote that condition of the human body in which there is an obvious and unusual increase of heat, and unnatural quickness of pulse, with disorder more or less general of several functions. In this sense it is applicable not only to fevers proper, inflammations, eruptions, hemorrhagies, and fluxes, but to many other maladies, which, though somewhat different in nature, agree, however, in this respect, that they are accompanied with unnatural heat, quickness of pulse, and more or less derangement

of function. In this sense we find symptoms of fever in several of those diseases which Dr Cullen has referred to the Neurotic class, as *diabetes* and *hydrophobia*;—and in those which he considered as depending on depraved habit (*Cachexiæ*), as *tabes*, *dropsy*, *scrofula*; and even in some which are ascribed to the operation of contagious poisons, as the venereal disease, and Arabian leprosy;—and lastly, we find symptoms of fever in maladies which depend on processes of disorganization, as consumption, cancer, and other like diseases. The very general and uniform occurrence of this condition in circumstances, so various and opposite, shows the necessity of proper distinctions, by which the use of the term may be more definite and accurate; and when these circumstances in which fever takes place are properly examined, we find that medical observers in general agree in the following conclusions.

Fever is primary or secondary, idiopathic or symptomatic, simple or complicated. Fever is said to be *primary* and *idiopathic*, when its phenomena depend on no other disease or topical affection; but *secondary* and *symptomatic*, when its presence is understood to indicate a morbid action going on in some particular organ, and to arise from that action. It is said to be simple when it is not combined with any other well-marked disease which can modify its proper and natural characters. These distinctions will be best understood by referring to actual examples, which, though necessarily derived by anticipation from subjects afterwards to be examined, I shall endeavour to render intelligible, by adducing those only which, if not generally, may at least be very easily known.

The common contagious fever of this country is found under ordinary circumstances to be unattended by the decided marks of local disease. Though generally presenting symptoms of affection of the head, yet practical observers have drawn distinctions between these symptoms, and those which arise from inflammation of the brain (*encephalia*), or of its membranes (*meningitis*, *phrenitis*). It is also rarely attended with marked determination to the organs of the chest or belly; and when these cavities are affected, it is either in a secondary manner only;—after the original disease has subsisted for some time;—or when circumstances concur to complicate the fever with such local affection. Every local affection indeed, which occurs in fever, may be traced either to the febrile action operat-

ing as an exciting cause, or to some peculiarity of the epidemic, or to season, or to endemial or individual peculiarities, or, in short, to accidental coincidence or complication.

I must notice, however, that attempts have been made by various modern authors, but especially by Selle, more recently by Autenreith, Clutterbuck, and Mills, and finally by Broussais, to prove that fever, if it do not in every case depend on some local affection, at least never occurs without such local affection. I shall have occasion, when treating of individual fevers, to show more particularly how far the opinions of these physicians are correct and consistent with the true phenomena of disease. At present it is sufficient to remark,—that the doctrine of idiopathic fever is not inconsistent with the admission of local affection; that in most cases of fever, whatever be the form or type, an affection of some organ or organs, or tissue, actually takes place to a greater or less extent; that the manner in which this local affection does take place, is not favourable to the opinion that it is the material cause or agent of the febrile motion, since it generally follows the fever, and ceases when it subsides; and lastly, that in other respects this hypothesis, for it cannot claim any other denomination, is a mere admission of the difficulty of accounting for the morbid process in which fever consists.

The improbability of this opinion is further apparent in the phenomena of inflammation and inflammatory fever, and in the effects which result from mechanical injury or violence inflicted on any part of the body. Local inflammation developed in any tissue or organ gives rise to the phenomena of secondary or symptomatic fever, which disappear as soon as the local inflammation subsides. In like manner a gunshot wound, compound fracture of an extremity, or a capital operation in surgery, is generally followed by all the phenomena of fever; and these phenomena continue so long as the cause from which they proceed continues to operate.

Different divisions of idiopathic fevers have been proposed by different authors, theoretical or practical, systematic or monographic. Since the time of Dr Cullen, whose division I presume to be very generally, if not universally known, the writers who have most attended to this subject are Stoll, Selle, Tode, Reil, Pinel, Alibert, Giannini, Good, Hildenbrand, Jackson, Armstrong, Percival, and Bateman. My plan and limits do not permit me to notice the labours of each

of these individuals, though I may refer the student to their writings, which contain much useful information, and many correct principles. I deem it requisite, however, to say, that while the Cullenian division has been very generally followed, Selle has exhibited one which, from its comprehensive character and extreme minuteness in its subdivisions, has attracted much attention among foreign authors.

Understanding by the term *Fever* every disease in which the temperature of the body is either sensibly or obviously elevated, with pulse natural, or quicker or slower than natural, and consequently including, like the *Pyrexiae* of Cullen, Inflammatory diseases and *Profluvia*, Selle distinguishes the whole Class into four orders; Continued (*FEBRES CONTINENTES*), characterized by continuity of morbid process and intense affection of the sanguiferous system; Remittent (*F. REMITTENTES*), characterized by alternate abatement and aggravation of the morbid process; Atactic or Irregular (*F. ATACTÆ*), characterized by moderate but irregular action, with peculiar irritability and sensibility of the nervous system; and Intermittent, (*F. INTERMITTENTES*), marked by intervals in the morbid process more or less complete. The first order is distinguished into two tribes (*genera*), the inflammatory and putrid; and each of these are distinguished into species, as they are attended with local inflammation, erysipelas, or rheumatism. The order of Remittents is distinguished into four general divisions; one with disorder of the gastro-enteric passages; the second with the presence of worms; the third proceeding from internal ulcer; and the fourth from obstruction of the viscera,—both corresponding with hectic. The two first subsections are distinguished, like the Continued Fevers, as they are attended by local inflammation, erysipelas, or rheumatism. The order of Atactic fevers comprehends three tribes (*genera*);—acute nervous fever spontaneous in origin; acute nervous fever from contagion, including the sweating sickness, jail fever, and plague; and slow nervous fever. The fourth order contains the whole of the forms of ague.*

Pinel, who has imitated the arrangement, and most of the distinctions of Selle, infers from the fact, that febrile maladies are liable to be complicated, either with each other, or by their influence on particular organs and functions, that the old di-

* Rudimenta Pyretologiæ Methodicæ. Auctore C. G. Selle, M. D. Berolini et Hagæ Com. 1773. 8vo.

vision according to their *type*, as it is named, is utterly inapplicable and inadmissible; and he has, therefore, distinguished and designated them according to the organic systems or organs which they seem most directly to affect, or the sensible effects which they appear to produce in the living body. This pyretological arrangement comprehends six orders; 1st, the *angiotenic* ($\alpha\gamma\gamma\epsilon\iota\omicron\nu, \tau\epsilon\iota\nu$), characterized by signs of irritation, and disturbance of the circulating function; 2d, the *meningogastric* ($\mu\eta\nu\iota\gamma\zeta, \gamma\alpha\varsigma\eta\zeta$), characterized by affection of the head, and derangement of the alimentary function; 3d, the *adeno-meningeal* ($\alpha\delta\eta\nu\ \text{glandula}, \mu\eta\nu\iota\gamma\zeta$), by moderate disturbance of the circulating function, with great change in the mucous secretion of the intestines; 4th, the *adynamic* ($\alpha\ \text{privat.} \delta\upsilon\nu\alpha\mu\iota\varsigma$), by much disturbance or enfeeblement of sensation and locomotion; 5th, the *ataxic* ($\alpha\ \text{priv.} \tau\alpha\acute{\xi}\iota\varsigma\ \text{ordo}$), or *malignant*, by irregularity of symptoms, with affection of sensitive and locomotive powers; and 6th, the *adeno-nervous*, distinguished by irregularity of symptoms, with decided affection of the conglobate glands.

We are informed by its author, that this arrangement has stood for many years the severest tests of criticism; that he has courted earnestly the critical observations of physicians the most enlightened in the city and in the departments; and that the result has been to satisfy him completely that it is the most natural of all arrangements; and that all the exceptions to its principles, and the objections which have been stated, have appeared to him to form mere varieties of his orders and genera. It would not suit my purpose to enter into any examination of the ingenious author's opinions, or to consider minutely the merits of the arrangement which he has so confidently eulogised. I admit that it has a very scientific and accurate appearance, and affects at least a more intimate union with pathological action, than any of its predecessors has yet aspired to. It is, nevertheless, to be observed, that, however well it may suit the phenomena and varieties of fever as they appear in France and in French constitutions, it will neither accurately nor justly apply to this disease as it occurs in the different countries of Europe, or in the East and West Indies. It involves in its ordinal and generic characters many phenomena, which are not always essential, and which are by no means peculiar to the forms of the disease which M. Pinel has created; it converts into essential or primary fevers, several diseases which

other nosologists would regard as local inflammations, or at least as not positive or unequivocal instances of idiopathic fever; and by its numerous subdivisions, it has given the subject of fever a degree of complication which there is no reason to believe it possesses, and which is completely useless either in a pathological or practical view. It is probable that the only accurate and just test by which the merit of nosological distinctions can be estimated,—long experience and observation of fevers and febrile epidemics, aided by the researches of pathological anatomy, will at length enable the world and the profession to appreciate justly the advantages of this philosophical arrangement.

Though the minute subdivisions of Selle, and the innovations attempted by Pinel, have warranted these observations, no similar excuse can be alleged for dwelling further on the arrangements of other writers on febrile diseases. Most authors appear now to have agreed with Borsieri, John Peter Frank, and Valentine Ernest Hildenbrand, in modifying the arrangement of Cullen by the admission of Remittent Fevers as a distinct family from that of Intermittent. The most serious objection to this arrangement is, that it is impossible to refer yellow fever either to the remittent or continued form; for the most intelligent observers of this disease admit, that it does not always present the same *type*, nor is it always possible to recognize those differences in febrile motion which constitute type. In all other respects, the division of idiopathic fevers, according to their *form* or *type*, into Intermittent, Remittent, and Continued, is at once most consonant with the natural phenomena of each, and most useful for the purposes of Practical Medicine. As these distinctions are founded on the mode in which the phenomena of fever precede, follow, and accompany each other,—or on the trains and sequences of those morbid actions of which fevers consist, authors both didactic and practical have thought, that the simplest and most perspicuous mode of communicating the natural history of these diseases, is to observe in what manner the succession of morbid actions differs from, or resembles, each other. In this comparison they have in general, like Cullen, adopted intermittent fever as a standard to which the others may be referred; and they have, therefore, given as a general model of febrile action, that assemblage and train of phenomena which constitute what is termed a fit of Ague, or a

paroxysm of Intermittent Fever. These phenomena are the following.

When a person is about to be attacked with ague, he first becomes sensible of remarkable languor and weakness, first referred to the pit of the stomach, then general listlessness, and aversion to effort, and incapacity of exertion, either mental or corporeal, without unusual fatigue, or even pain and soreness of the limbs. At the same time he is subject to frequent involuntary yawning (*oscitatio*), and stretching (*pandiculatio*), and occasional fleeting sensations of cold. In some instances, indeed, the sense of cold is first felt, and afterwards the sinking sensation in the *epigastrium*. Shortly after, the face becomes pale, the features shrink, the bulk of every external part is diminished, and the skin, instead of its natural soft, warm, and moist condition, becomes hard, dry, and rough, with inequalities, and appears as if constricted by cold, giving rise to the appearance named goose skin (*cutis anserina*.) An observer may, at the same time, remark that sundry parts of the body, but especially the extremities, as the nose, hands, and feet, are colder than natural; and the individual himself soon after feels a sensation of unwonted cold, generally first in the back, afterwards over the trunk, and entire person. As this sensation increases, and becomes general, the individual is affected with shivering and trembling motion of the whole frame (*rigor, horror, horripilatio*); the scalp is painfully constricted; the breathing is confined, panting, and anxious; and the well-known phenomena of rattling of the teeth (*stridor dentium*,) and knocking of the knees, are generally conspicuous, and prevent the patient from attempting any duty requiring accurate motion. When the sensation of cold, the shivering, and trembling have continued for some time, they gradually diminish, and are succeeded by sensations of heat and flushing, which generally commence about the neck and face. The cold continues to decrease, until it goes off entirely; and the heat, which was at first temporary and partial, becomes at length general, constant, and greater than usual. The natural qualities of the body and skin are at the same time restored; the inequalities disappear; the fulness returns with the heat; and a preternatural redness appears, especially in the face. When these symptoms have continued a little, the skin of the forehead and countenance becomes moist, and successively that of the

neck, breast, and whole person, until sweating is general. The heat then becomes sensibly less, and as the cutaneous discharge continues to flow, declines to its natural standard, and at the same time the body returns to its usual condition.

It is obvious that, in this train of morbid events, the history of which has been now delivered, the body is never in a fixed or stationary condition; but that, from the first moment when the patient complained of languor and shivering, to the last, when sweating ceased, and left the temperature in its usual state, there is an uninterrupted series or succession of phenomena which pass into each other by insensible steps. It has been deemed convenient, however, to divide the whole process, which in this case is named a fit or paroxysm, into three parts, according as they are more eminently distinguished by unnatural cold, unnatural heat, or unnatural cutaneous discharge. Practical authors, therefore, divide the fit of an ague into the *cold*, the *hot*, and the *sweating* stage.

The description which I have here given contains only those obvious and superficial characters to which the attention is readily and forcibly called. But during the paroxysm of intermittent fever, various changes are found to take place in the functions of the living body, a knowledge of which is indispensable to complete the history of the morbid state termed Fever. These changes may be enumerated in the following order, as they occur in the functions of circulation, respiration, digestion, and secretion,—in sensation, locomotion, thought, and volition.

On the first approach of languor, the pulse becomes slower and weaker than usual, while the heart contracts very feebly; and as the sense of cold comes on, it becomes small, contracted, frequent, and occasionally irregular. As the cold recedes, and the sensation of heat approaches, the pulse becomes regular, hard, and full, while the heart contracts with a heavy labouring stroke, and the hardness and fulness increases gradually, without abatement of frequency, till sweating commences. The respiration during the cold stage is short, frequent, panting, and oppressed, with occasional sighing; as the hot stage comes on, it becomes full and less oppressed, but continues to be panting and anxious till sweating is established, when it is greatly relieved. The approach of the cold stage is almost invariably marked by a sense of weakness about the pit of the stomach, distension, and flatulence; the appetite ceases, more or less

squeamishness (*nausea*) and sickness come on, and these are generally followed by vomiting, first of the contents of the stomach, afterwards of bilious fluids, more or less pure. As the heat proceeds, and the skin becomes moist, the sickness gradually declines; and after sweating is established, the stomach becomes tranquil, and vomiting ceases entirely. Much thirst is felt during the whole fit; the mouth and throat are dry, parched, and clammy, and the tongue is loaded with a viscid yellow fur. As sweating proceeds, the mouth and throat become less dry, and the tongue, though loaded, becomes moist. In ordinary cases, the belly continues bound during the whole paroxysm, and stools take place only towards its termination, or after that event. In a certain class of cases, however, to be afterwards mentioned, alvine evacuations are so frequent during the paroxysm, as to constitute diarrhœa, or an approach to bilious diarrhœa.

That the different secretions are much impaired during the paroxysm is proved by the circumstances now mentioned regarding the cutaneous discharge, those of the mucous surfaces, and the salivary secretion in particular. There is little doubt, also, that a considerable change takes place in the biliary secretion, and in the circulation of the entire hepatic system of vessels, especially in those forms of ague accompanied with constant bilious vomiting, and occasional bilious diarrhœa. The urinary secretion is not less deranged. In the cold stage, the urine is pale, and almost colourless, without cloud or sediment, or with a very slight cloud of mucus suspended. In the hot stage, it becomes high-coloured, though still void of sediment. After sweating is fully established, it becomes turbid, and deposits a sediment generally lateritious, and continues to do so for some time after the close of the paroxysm.

In other respects, changes are observed which indicate a remarkable derangement in the capillary circulation. Tumours on the surface shrink considerably during the cold stage, and recover their size during the hot and sweating stages. Ulcers become dry during the former period, and begin to discharge matter in the latter.

A similar state is indicated by the changes in the animal functions. The incipient sensation of epigastric languor and oppression is generally accompanied with headach, listlessness, want of energy in the mental faculties, indicated by inattention

and some loss of recollection, and drowsiness, which in some instances proceeds to *coma* or insensibility. At the same time, if the patient retains sensibility, he complains of dull heavy aching pains of the back and limbs, which are referable chiefly to an affection of the muscular system. As the cold stage declines and gives place to the hot, the headach becomes more intense, and is accompanied with darting pains in the eyeballs, some aversion to light and sound, and much throbbing of the temples, all which are alleviated on the appearance of sweat, and are finally removed on its full establishment. In other instances, the approach of the hot stage is indicated by increased vivacity, excited attention, a vivid flow of ideas, and sometimes complete delirium.

The assembled train of phenomena now enumerated, constitutes a paroxysm or fit of fever. On their cessation, the functions return to their usual state, and, with the exception of a considerable degree of weakness, the patient feels that his health is in the same state in which it was before the attack. In short, his pulse and respiration are in the meantime natural, and though his tongue is furred, his mouth clammy, and his appetite not very keen, he is in all respects well. If this state continues, he recovers without any further recurrence of the disease. Much more frequently, however, after a shorter or longer period, the same train of phenomena begins to appear, and pursuing the same course nearly, terminates in the same manner; and these alternate states of fever and apyrexia, or quiescent intervals, continue to be repeated for a great number of times; and though after each repetition the symptoms are considerably modified, both in intensity and duration, the general resemblance in the mode of succession is, on the whole, accurately observed. In distinguishing these successions and alternations of morbid phenomena, it is usual to denominate the length of time from the end of one paroxysm to the beginning of another, an *intermission* (*apyrexia*; *intermissio*); and the space or intermission thus marked is to be distinguished from what physicians have named the *interval*, which comprehends the whole time from the beginning of one paroxysm to the beginning of another, and consequently includes the duration both of the paroxysm and of the apyretic space.

Every febrile attack may be said to consist of the assembled train of phenomena just described; and the variations consist

principally in the greater or less distinctness with which the intermission is marked.

When the disease consists of several paroxysms, between each of which there is a distinct space without any febrile symptom (*intermissio* ; *apyrexia*), it is denominated an Intermittent fever or Ague (*Febris Intermittens*), (Wechsel Fieber). When it consists of paroxysms in which the intermissions are imperfectly marked, or are still attended by febrile symptoms, though in a milder form, it is denominated a Remittent fever. When the intermissions are so indistinct that they are merely distinguished by slight temporary alleviation of symptoms, the disease is denominated Continuous or Continued fever, (*Febris Continens*).

1. The intervals in such paroxysms may be of different lengths; and from these differences physicians derive the distinguishing characters of the several species and sorts of intermittent fever. The most ordinary interval is that of forty-eight hours, which is named the Tertian period. The next most common is that of seventy-two hours, and is named the Quartan period. When the interval does not exceed twenty-four hours, the fever is said to assume the Quotidian type, which, though less common than either the tertian or quartan, is, however, not unfrequent.

Some observers have remarked longer intervals than that of the quartan, and have described a quintan or even septan intermittent; but there is reason to believe that these are merely irregular forms of the tertian and quartan, the first of which is liable to have its alternate paroxysms mild or occasionally imperceptible, while in the second the paroxysm may be modified in that manner which is denominated retarding. If, therefore, it is not a matter of great doubt, whether intermittent fever occurs under any other forms than those of quotidian, tertian, and quartan, it is certain that any further distinction is of little practical utility.

2. The paroxysms of pure intermittent fever are always finished in less than twenty-four hours. In some situations, however, fevers are observed to consist of several separate paroxysms, between which there is no distinct interval free from fever. But, though in such fevers the hot and sweating stages do not entirely cease in twenty-four hours from the commencement of the paroxysm, they undergo a considerable abatement or remission of their violence; and at the return of

the quotidian period, the paroxysm is in some degree renewed, always with a cold stage more or less distinct, and runs the same course as before. These modifications, which are observed to occur chiefly in the tertian and quotidian, but may appear also in the quartan, constitute the Remittent fever of practical authors. By Cullen they were considered as not sufficiently peculiar in characters to form a distinct family or section, as he would have termed them, of fevers; but were accounted as mere varieties of the tertian and quartan forms; and in this manner, accordingly, he has mentioned them in his methodic arrangement. Recent, and perhaps more extensive and accurate observations show that it is more consonant to natural appearances to rank them as a separate family; and I accordingly follow the example of Sauvages and Borsieri in treating of Remitting fevers apart from Intermitting fevers.

3. In many situations, it is observed that the febrile paroxysm which has been described above, when once commenced and established, undergoes neither interruption nor very distinct abatement or remission of its violence. When the hot stage is once established, it continues without showing any tendency either to pass into the sweating, or to subside in any other manner, and seems rather, at certain periods of the disease, to become more violent, in the circumstances of greater heat of the body, dryness and heat of skin, frequency and strength of pulse, with more obvious alteration in several functions. Such a temporary aggravation of symptoms is technically named an *exacerbation*, and the fevers in which it occurs are termed Continued. In such forms of fever, it is observed, that, as there is no distinct termination or remission of the paroxysm by cutaneous discharge, neither is there any obvious renewal of it, after commencement, by well-marked cold fit,—but merely occasional chills and sensations of cold. In short, intermittent and remittent fevers are distinguished, so far as relates to type, by a distinct interval of *apyrexia*, or a remission of symptoms equally distinct;—whereas the circumstance which characterizes continued fevers is the aggravation or *exacerbation* of their symptoms.

In some cases of continued fever, the remissions and exacerbations are so inconsiderable as not to be easily observed or distinguished; and some physicians have therefore concluded that there were cases of fever consisting of a single fit only, and which they designated as a Continent Fever. There

is perhaps no great harm in admitting this distinction, which is at best a very trifling one. But it may be justly doubted, whether there ever was a case of *pure idiopathic fever*, which observed this uniform and uninterrupted course; and it is not improbable either that its existence was derived from insufficient and imperfect observation, or that such continued fever depended on an unobserved or unknown affection of a particular organ.

Having premised these distinctions on the differences of idiopathic fevers, I proceed to deliver the history of the separate families and their individual *genera*. I must here observe once for all, that, in delivering the history of diseases, I shall endeavour on every occasion to confine my enumeration to those events or phenomena which are uniform and not liable to variation. It often happens, especially in the actions of living bodies, whether in health or otherwise, that in particular circumstances irregularities or varieties occur, which are neither easily foreseen, nor readily explained. Such deviations are not to be viewed as the general characters by which the disease is attended, but as incidental occurrences, which, not to be overlooked by the medical attendant, are, however, inadmissible in a true and faithful description of any process in the living frame.

CHAPTER I.

AGUE—INTERMITTENT FEVER.

Thomæ Sydenham, *Observationum Medicarum circa Morborum Acutorum Historiam et Curationem. Sectio I. Constitutiones Epidemicæ*, 1661-2, 3, 4. Lond.—Thomæ Willis, *Tractatus de Febribus*, Cap. iii.-vi. Lugdun. 1681.—Ricardi Morton, *Pyretologia seu Exercitationes de Morbis Universalibus Acutis*. Lond. 1692.—Franc. Torti *Therapeutice Specialis*. Mutinæ, 1712.—Senac de *recondita Febrium Intermittentium tum Remittentium Natura*, &c. Amstelod. 1759.—An *Essay on Fevers*, &c. by John Huxham, M. D. Lond.—*Observations on the Diseases of the Army*, by John Pringle, M. D. &c. 4th edition, Lond. 1764.—Wenceslai Trnka de Krzowitz *Historia Febrium Intermittentium*. Vindobonæ, 1775.—*Observations on the Epidemical Diseases in Minorca*, by George Cleghorn, M. D. London, 4th edition, 1779.—A *Treatise on the Fevers of Jamaica*, with some *Observations on the Intermittent Fever of America*, and an *Appendix*, &c. by Robert Jackson, M. D. Lond. 1791.—*Observations on the late Intermittent Fevers*; to which is added a *Short History of the Peruvian Bark*, by Sir Geo. Baker, 1785. *Transac. of the College*, iii. p. 141.—Alibert *Traité des Fievres Pernicieuses Intermittentes*. 4me edit. Paris, 1809.—E. M. Bailly, *Traité Anatomico-Pathologiques des Fievres Intermittentes Simples et Pernicieuses*. Paris, 1825.

§ I.—SEMEIOGRAPHY.

I have already mentioned the general characters which distinguish intermittent fevers, and remarked the circumstances by which they are to be distinguished from each other. These circumstances, it will be remembered, are to be found chiefly in the different lengths of the interval; and according as the commencements, or initial points of the several paroxysms are separated by twenty-four, forty-eight, or seventy-two hours, the fever is said to be *Quotidian*, *Tertian*, or *Quartan*.

Quotidian Ague. *Quotidiana Intermittens*.

This form of ague consists of similar paroxysms which occur every morning sometimes so early as four or five o'clock. Its approach is described as being made with a simple sensation of cold (*frigus tenue*)* or chilling (*perfrigeratio*),† but without any of the violent shivering which is observed in the tertian ague. This sensation is attended with heartburn, sickness, and distension of the epigastric and hypochondriac regions. Some cases present headach, others a fainting state, and many vomiting or loose stools, or both. When these symptoms have continued some time (three hours), the patient feels occasional and partial increase of temperature, and at length becomes warmer, but without that intense heat and thirst which are observed in other agues. In different cases the heat of the skin is said to be moderate, or so peculiar as to affect the touch of a person in health (*mordax ad tactum*); and the authority of Galen has been adduced to say that, though mild to the sense of the patient himself, it is not without a biting or acrimonious effect.‡ It may be questioned, however, whether the fever in which Galen observed this symptom was the genuine quotidian; for I find it noticed in no modern observer except Borsieri; and Hildenbrand seems to take it on the authority of Galen.

The pulse which, during the cold stage, is irregular and weak, becomes quicker, but very rarely hard; and it is sometimes actually softer than before. Drowsiness, or a tendency to sleep, is at the same time very common. If the urine be examined during the paroxysm, it will be found pale and thin

* Iodoci Lommii, Hoffmann. † Hildenbrand.

‡ Hildenbrand, ii. 54. 21. Burserii Ins. cxxvii.

in the cold stage ; but crude and imperfect, and turbid as the paroxysm goes on.

These events in a short time (about two hours or more) gradually pass away without any copious sweat ; and the patient, about eight or ten hours from the commencement of the paroxysm, feels himself dull and heavy, but without any positive complaint.

The duration of the paroxysm is generally about ten or twelve hours ; in some tedious cases it has been known to extend to eighteen. This shows that, other circumstances being equal, the quotidian has a longer paroxysm than any other form of intermittent fever. (Hildenbrand, 54.) The intermission is seldom less than six hours ; but, as may be easily seen, will occasionally extend to twelve.

The paroxysm of quotidian has been said to occur not only in the morning but at noon, and even in the evening and night. It is probable that quotidian paroxysms which occur at noon or in the night, are symptomatic of some local disease, and are in some instances to be regarded as hectic accessions. It may be doubted whether any paroxysm occurring during the night is ever a true ague, but rather a fever of some other nature. (Vide Cullen's Synopsis, B. 2. Q. Vespertinæ.)

The quotidian ague is a disease which attacks young children, and old people, plethoric, or phlegmatic subjects who are liable to derangements of the alimentary function, and especially females of inactive habits. It is most prevalent about the winter solstice, or in the spring ; Sydenham says he never saw a genuine quotidian in autumn ; it occurs, however, in the same circumstances in which tertians and quartans are formed, and is said sometimes to follow the former, and occasionally to precede the latter.

The quotidian ague is liable to be mistaken for the double tertian, the semi-tertian, the triple quartan, simple remittent, and hectic fever. From the first, second, and third, it is to be distinguished by the time at which accession takes place, by the regularity of its paroxysms, and by the subjects affected ; from remittent fever by the appearance of intermission, by the endemic constitution, and by comparison of the symptoms of remittent fever ; and it may always be distinguished from hectic by a knowledge of the patient's history,—that he has not been exposed to the causes of ague, but has suffered, or is suffering, under some local disease,—by the periods at which the parox-

ysms of each respectively appear, and by want of a decided sweating discharge in quotidian ague. On this account, the quotidians mentioned by Borsieri to attend hysteria, hypochondriasis, diseases of the liver, spleen, &c. and the pulmonary quotidian* which accompanies tubercular deposition and other diseases of the lungs, are to be excluded entirely from this kind of fever, and considered in their true light as the uniform hectic fever which is symptomatic of an internal morbid process.

The duration of the simple quotidian will vary according to the kind of subject, the circumstances in which he is placed, and the season of the year. As the individuals whom it attacks are generally languid delicate subjects, whose fibre, as it is said, is lax, or little irritable, it often runs through many paroxysms, before it shows a tendency to disappear. In more favourable cases it changes into a tertian, and then gradually disappears after five or seven paroxysms. It disappears more readily if the patient is withdrawn from the situation in which he was originally affected with it. The autumnal or winter quotidian is uniformly more tedious than the vernal, and the patient sometimes does not get rid of it till the dry air of summer is fully established. In Jamaica and other warm countries the quotidian is said to be more dangerous than either the tertian or quartan.

Such are the principal facts relating to the *true genuine or exquisite* quotidian ague; a *spurious one* is mentioned by authors, but they do not speak of it with precision.

Besides this affection of the whole system an aguish disposition will sometimes manifest itself by appearing daily in a particular part. This is the modification of quotidian named *partial* (Synopsis, B.) by Dr Cullen. It may appear in the form of an intermitting headach, an intermitting ophthalmia, an intermitting rheumatism, an intermitting sciatica, or sometimes of an aguish neuralgia. Particular accounts of these varieties will be found in the references. All of them are to be viewed as dependent on the intermittent character, and are generally the relics of former agues. They are very much influenced by the exciting physical causes of ague; and it is not uncommon for them to disappear during fine weather, and return as soon as the east wind blows, or the atmosphere is moistened and chilled by a copious fall of rain. I have seen an aguish

* Jones, p. 127. Burserii Institution. cxxxix. cxli. cxlii. cxliii.

headach, as it is named, recur at a stated period daily for several weeks, when the vernal east wind, which is uniformly cold and moist, prevails, resist every means that had been used to check it, and disappear spontaneously as soon as the south or west wind set in, or the patient changed his residence.

Tertian Ague; La Fievre Terce; *Tertiana Intermittens*; *Tritea*; *Triteophya*.

This disease is characterized by the paroxysm coming on in the early part of the day, some time between nine and three, (Hildenbrand, 57,) generally at noon, and returning at the same hour, after the space of forty-eight hours from the beginning of the previous paroxysm. The patient generally complains first of a heavy sleepy languor, and of lassitude, which is partly to be ascribed to actual weakness, partly to laziness, and a degree of moral indolence. Yawning, stretching of the members, and in some instances a sensation referred to sundry parts of the skin, and compared to the creeping of ants (*myrmecia*, *formicatio*) quickly follow. This symptom is almost immediately succeeded by complaints of cold in some part of the back; in less uniform instances the tertian chill (*rigor*) is said to commence in an extremity, or in one side of the head. Complete shivering soon takes place, and continues with pain in various parts, not unfrequently in the back, and an uneasy sensation of tightness and anxiety in the epigastric (*præcordia*) and hypochondriac regions, at least for an hour. At this part of the process, a sense of squeamishness, which was at first slight, augments; and as the shivering and cold become less violent, the patient begins to retch, and the contents of the stomach are finally rejected. The degree of this symptom depends on two circumstances,—the state of the stomach and alimentary canal, and the stage of the fever. If the gastric or intestinal mucous membrane be much loaded with mucus, or imperfectly altered food, vomiting of these matters occurs first, and is afterwards followed by bilious vomiting. In other instances in which this state of the stomach and intestines is not present, vomiting is either less frequent or less violent, and fluid stools merely take place. Further, when the fever is fully formed, it appears to exercise considerable influence on the stomach, intestines, and liver; for generally a great quantity of biliary fluid is rejected by vomiting, or discharged by stool.

The vomiting may be considered as the termination of the

cold, and the beginning of the hot, stage of tertian ague. * The temperature of the body then returns, increases gradually, but quickly, in some instances it is said to 103° or 104° F., with increasing thirst, and lastly, terminates in a general and copious discharge from the skin, which continues at least two, generally three or four hours. The whole paroxysm is seldom over in less than six hours; sometimes it extends to eight, but is always concluded in less than twelve hours; and whenever it exceeds this, it is not to be regarded as the pure or genuine tertian ague. In the true simple form, the paroxysm generally commences at noon, and is finished the same evening. A state of *apyrexia*, which is generally very complete, follows, and the patient experiences only some degree of weakness, or in some instances soreness in the members. In other instances, though the pulse is quite natural, or nearly so, bad taste, loss of appetite, headach, and pain in the back and pit of the stomach, are the traces which the tertian paroxysm leaves behind it.

The duration of the apyretic space or *intermission* depends on the length of the paroxysm. It is never shorter than twenty-four hours; and if the paroxysm is concluded within twelve, it of course extends to thirty-six. After this time, that is, at the end of the intermission or apyretic space, the paroxysm is again renewed with nearly the same phenomena with which it formerly commenced.

To this general course of things exceptions are occasionally observed. The commencing shivering is sometimes slight, and without distinct sense of cold; or if the patient feels it, his skin is warmer than natural. In some cases the heat is intense, and every symptom of the hot fit is violent; in others they are moderate. In a few instances the paroxysm has been known to terminate in copious discharge of urine, or in fluid stools, rather than by sweating. And lastly, complications may occur in which the ague is combined with some local or visceral inflammation. †

The number of paroxysms to which a tertian may be prolonged will depend on the situation in which the patient is placed, and on the means which are used to modify or cure the disease. It rarely terminates before the fourth; it is sometimes finished on the fifth; but is generally found to recur

* Cleghorn, ch. iii. 153.

† Ibid. 159.

seven or nine times ere it shows any tendency to disappear. If it go on to the seventh paroxysm, it cannot be expected to cease before the ninth ; but tertians are seldom of so long duration. In some favourable cases, besides the ordinary discharges by increased flow of urine and copious sweating, an eruption of vesicles, or scabby pustules (*essera ; herpes*) has appeared on the lips and mouth, about the third or fourth paroxysm ; and the disease has disappeared spontaneously on the seventh. In situations, on the contrary, where the patient continues exposed to the causes which originally induced the disease, it may be prolonged until it is converted into a double tertian, or into a quotidian, or until it is complicated with symptoms which render it dangerous or fatal. We learn from these facts that the simple tertian is seldom, under proper treatment, a dangerous disease, but may become so by want of employing in time those means under the use of which we know that it will disappear.

There is no form of ague so common as this, and none which shows more clearly the general phenomena of these diseases. It attacks adults more frequently than children, men more frequently than women, and the robust and sanguine more than the pale, the delicate, or the phlegmatic. The genuine tertian is a disease of all moist countries which are subject to intermittents. It is found most regular where the moisture is pure or unmixed with exhalations issuing from organized matter in a state of elementary decomposition.* It may occur at any period of the year in certain situations, but is most frequent between the summer solstice (June 22) and some weeks after the autumnal equinox (Sept. 22.) After this period tertians begin to decline, and are in general either very rare, or almost unknown at the winter solstice. A few weeks before the vernal equinox (March 22) they again appear, but in a mild form, and continue until the summer heat begins to be constant, and warm the air thoroughly, when they generally disappear till after the summer solstice. On reappearance at this season they follow the same course as in the earlier period of the year. The tertian ague, in short, in the words of Hildenbrand, prevails chiefly between the equinoctial seasons, terminating the vernal agues, and introducing those of autumn, (57, p. 22). It thus appears that there are two seasons of the

* Pringle, p. 173, §. 2.

year,—spring and autumn, when tertian agues chiefly affect the persons of those exposed to its exciting physical causes. The Vernal Tertian is generally a short, slight, and safe disease, often spontaneously disappearing ; so much so that it is popularly believed to purify the system, and prove a remedy to other maladies. The Autumnal Tertian is always more tedious and obstinate, often continues the whole winter, and in some instances is dangerous or fatal. There is reason to believe that much of this difference depends on the difference of season, the dry warm air of summer always furnishing a favourable condition for the removal of ague ; whereas the humidity and cold of the winter atmosphere is too often favourable to its continuation.

The Tertian ague has been observed to be liable to variations, which have been referred by Dr Cullen, in imitation of Sauvages and others, to the following heads.

1. Variations in the length of the paroxysm.
2. Variations in the time when the paroxysm returns.
3. Variations in the symptoms with which it is attended.
4. Variations in the diseases with which it may be complicated.
5. Variations in the agent by which it is produced.

On the first of these causes of variation I have merely to repeat, that when the paroxysm exceeds twelve hours, the fever is to be regarded as a spurious form of tertian (*Tertianà Notha*). The second cause of variation I shall consider presently. The third and fourth are not peculiar to tertian ague, but common to every form of intermittent fever, and will be more properly considered in the subsequent general division of the subject. In the last I do not believe.

The variations in the time at which the paroxysm returns are the foundation of some curious distinctions in the forms of tertian ague. They may be referred to the following heads.

1. The paroxysm may return daily, and in this respect give the ague the appearance of a quotidian. But it is to be distinguished from this by the time of day at which the paroxysm approaches, which is not in the morning as in the quotidian, and by not observing the same hour daily, but on alternate days only. This is what is named the Double Tertian, (*Tertianà Duplex*), because there are two fits and two intermissions in the

same space of forty-eight hours, which includes only one interval of true tertian. The paroxysm of the first day comes on at noon, and terminates like that of a regular tertian in the evening. On the second day it comes on in a milder form in the afternoon or evening, and goes off early next morning; but at noon of the same day, a third paroxysm returns with the same severity of symptoms as on the first day, and runs the same course. In this case it will be observed that the fits of the first, third, and fifth days, or the odd ones, are the true tertian paroxysms, and that they correspond in duration and severity throughout the disease;—and that the fits of the second, fourth, and sixth, or even days, which are shorter in duration, and slighter in symptoms, also correspond throughout the disease. This common form of double tertian (*T. Duplex*), is generally a vernal ague, and is much more common than the quotidian which it resembles. It is also more easily removed, terminating in some instances spontaneously, about the seventh paroxysm. It is liable, by losing the even paroxysms, to become simple tertian. It is common in Italy, and especially at Rome, where it was observed long ago by Asclepiades the Bythinian, and more recently by other physicians of that city, (Hildenbrand, 66), and by Cleghorn in Minorca (Cleghorn, 157).

2. It sometimes happens, that, instead of the order of fits which I have now described, the disease is introduced with a mild fit in the evening, and followed by a more violent and complete one the succeeding day. On the evening of the third day, again, a mild fit appears once more, and is succeeded by a severe one in the same manner throughout the disease. This arrangement of the slight fits appearing on the first, third, and fifth days, is much less frequent than the other. As both fits occur in general within the space of twenty-four hours, this form has been termed the Doubled Tertian (*Tertiana Duplicata*). It has been distinguished by Cullen as consisting of two paroxysms on the same day; and is represented by Cleghorn to begin in the following manner. On Monday evening a slight fit comes on, and goes off next morning; but on Tuesday, towards noon, a more severe paroxysm begins, and continues till night. This is followed by an intermission to Wednesday evening, when a slight fit introduces a new period, which runs the same course as the first; so that, ac-

cording to the usual mode of calculating the days of diseases, by reckoning from the first hour of invasion, both paroxysms happen on the odd days, while the great part of the even days is calm and undisturbed. It is a general fact, with regard to the double or doubled tertians, that the intermission which follows the severe fit is always the most complete; for the slight fit too often ends in a mere remission, and lingers thus till the severe and perfect paroxysm commence.*

3. The next variation of the time at which the tertian paroxysm returns, constitutes that form of ague, which has been named the Semitertian of the first order (Galen), or the Triple Tertian, (True Semitertian of Hoffmann). It consists of a daily paroxysm, but is distinguished by having two paroxysms in one day, and one on the next; so that within the ordinary tertian interval of forty-eight hours, there are three fits and as many intermissions. On the first day, for instance, about noon, the patient is attacked with a paroxysm, which declines about five or six in the same evening; a few hours after another fit begins, and continues till morning of the following day; after which time there is an intermission till evening, when a third fit comes on, and continues the greater part of the night. On the following day there are again two paroxysms, in the same order, and at the same time, as on the first; and thus the ague proceeds with a double fit on each of the odd days, first, third, fifth, &c. and a single one on the even days, second, fourth, sixth, &c.

4. The last variety of this kind mentioned by nosological authors is the semitertian of the second order (Galen), the semitertian of Agathinus and Celsus † (*hemitritaeus*, *amphimerina hemitritaea*). It has occasioned some difference of opinion among physicians on the train of its paroxysms, ‡ and its nosological place; and I am not certain that I could determine the points of doubt. I look on it, however, as more allied to remittent than intermittent fever; and I shall therefore reserve the little to be said of it till I treat of remittent fever.

Quartan Ague; La Fievre Quarte; *Quartana intermittens*; *Q. simplex*; *Quartana legitima*; *Tetartaea*; *Tetartophya*.

The Quartan Ague is distinguished by the recurrence of its

* Cleghorn, 155.

† Ibid. 156.

‡ Hildenbrand, 67.

paroxysms after two apyretic days (forty-eight hours), and by its accessions coming on in the afternoon generally at four or five o'clock.* In these phenomena it is wonderfully regular. Its commencement is marked by remarkable languor, stretching (*pandiculatio*), and bruising pain of the head, back, loins, and legs. The hands and feet become cold, the whole body pale, the face and nails livid, shuddering, and at last convulsive shivering succeed, the tongue and lips tremble, the breathing is oppressive and frequent, with a sense of anxiety at the heart (*præcordia*), and the whole person is shaken with irresistible violence. In some instances this degree of cold and shivering does not take place in the first and second paroxysm; but in the subsequent ones it is always very violent, and has been known in some cases to break the teeth, or dash them from their sockets.† These symptoms continue generally two, sometimes three, hours; and during this time the patient is distressed with intense thirst, the pulse is slow, hard, contracted, and irregular; and the belly is generally bound, though in old persons retching, vomiting, and loose stools are observed. In many cases, chiefly of aged subjects also, the head is greatly confused, the attention wanders, and incoherent expressions are uttered.

The chill and shivering condition which we have described is at length slowly followed by a sense of heat, which by no means corresponds in intensity with the previous cold,—less violent than the tertian, but more so than the quotidian heat,—and which is chiefly distinguished by the uneasy and parching dryness of the skin, with which it is attended. As the shivering subsides, the pulse becomes regular, quicker, and fuller, but almost never attains the rapidity of the tertian pulse; the confusion of head is succeeded by pain, or at least uneasiness, or even dizziness; a very sparing discharge of sweat slowly appears; and in the course of four or six hours of these symptoms the paroxysm is finished. After the feverish symptoms have disappeared, the patient feels, during the two days' intermission, bruising pains in the joints and bones (*dolores osteocopi*), some degree of weight in the head, and not unfrequently languor and impaired appetite. In other respects he is free of complaint.

This description shows that while the quartan ague has the

* Hoffmann, chap. ii.

† Burserii, Institut. clxxxi.

longest interval, (three days or seventy-two hours), it is also distinguished in having the longest and most violent cold stage (two, three, or four hours more than the quotidian or tertian), but on the whole the shortest paroxysm. The last circumstance, if it cannot be ascribed to the imperfect degree, or rather total want of the sweating stage, may at least be considered as closely connected with it, and proceeding from the same general cause.

The genuine quartan is a disease of languid adults, aged persons, those subject to hemorrhoidal discharges, those of the melancholic temperament, or, in short, those whose health is impaired by study, intemperance, or mental distress. It is almost entirely an autumnal ague, * appearing in general between the equinox and the winter solstice, and continuing in some instances the whole winter. It is almost never a vernal disease; and when it appears at that season it can generally be traced to a latent autumnal ague, or will be found to be a relapse of such ague. More obstinate, intractable, and liable to recur than other agues,—a species of puzzle to the practitioner,—it is said, however, to be without danger, and very rarely to kill. † Thus like the tertian, it is never spontaneously curable; but generally requires active and seasonable remedies, and a concurrence of favourable circumstances. It has an especial influence in altering the structure, and deranging the functions of the liver, spleen, and pancreas; and the process of digestion is always more or less injured.

Such are the principal facts relating to the history of the genuine or legitimate quartan ague. But like the tertian it is liable to variations in the time at which the paroxysm returns, which will be easily understood by merely mentioning them, after what has been already said of the variations of the tertian.

1. When there are two paroxysms every fourth day, but the two intermediate free, the disease is termed the doubled quartan (*Quartana Duplicata*.)

2. When the paroxysm occurs two days successively, but leaves the third undisturbed, and returns on the fourth as it did the first, and the fifth as it did on the second, the disease is termed the double quartan (*Quartana Duplex*). Cullen, Borsieri.

* Hoffinan, cap. II. §. xiv. † Sydenham, v. 21.

3. When there are three paroxysms every fourth day, but none on the two intermediate days, the disease is termed the *tripled quartan* (*Quartana Triplicata*).

4. When the paroxysm recurs every day, but in such order that the paroxysm of the first day corresponds in accession and severity to that of the fourth, while the paroxysm of the second corresponds to that of the fifth, and the paroxysm of the third to that of the sixth, and again in the same series, the disease is termed the *triple quartan* (*Quartana Triplex*). Cullen, Borsieri, Hildenbrand.

Of these the most common seem to be the *doubled* and *tripled* quartans, which occur chiefly during autumnal epidemics. They are liable to be mistaken for quotidians, but in general evince their difference, by passing into the simple quartan. The doubled quartans are believed to be more fatal than the tripled quartans.

Such are the phenomena of the three species of ague, with the modifications which take place in the mode of paroxysmal accession. Among all these modifications of the simple or genuine agues, the most common are the doubled quotidian, the doubled tertian, the doubled quartan, and the trebled quartan. (Hildebrand, 64, p. 26.) These are in general autumnal agues, and they are the form which the disease assumes in the warmer countries of Europe, where the surface is favourable to the production of the disease.

Some physicians have attempted to explain these double or duplicating agues by assuming the co-existence, in the same person, of two distinct fevers. The double tertian for instance, which is known by recurring with irregular paroxysms daily, may be viewed, it is said, as two distinct agues, the one of which appearing on the odd days, (first, third, fifth, &c.) is to be considered as the true one, while the other is a distinct disease and of a spurious character. In the same manner nearly, though not with equal facility, has it been attempted to explain the duplicating forms of ague. Of this explanation it may be remarked, that it may be true or false so far as the facts are hitherto known. For some of them, indeed, it accounts; but others, and I believe the most numerous, it will not satisfactorily explain. It is further a mere opinion, by no means necessarily connected with correct knowledge of the disease, and as such I quit it without further notice.

Agues not referable to the above heads (*T. Erraticæ*). Erratic or Irregular Intermittents.

An ague consisting of paroxysms returning on the fifth day, or after four days of undisturbed *apyrexia*, has been noticed by Tulpus, Van Swieten, and some other authors, and therefore named Quintan (*Quintana*, *Pemptaia*, *Pemptophya*). It is certainly not impossible that such paroxysms may occasionally occur; but it seems exceedingly doubtful that an ague should actually exist, the fits of which observe in their accession this considerable intermission with regularity. It may happen that the quartan in some part of its course, either before it is fully formed, or when it is about to disappear, shall have a fourth day fit, either so mild and indistinct, as to escape superficial observation,—or may actually have the fourth day paroxysm deferred till some time of the following day, as occurs in the retarding quartans. It may also happen, and perhaps much more frequently, that the simple tertian in some situations,—when it is mild,—before it is fully formed, or when about to decline, may have its ordinary paroxysm mild and indistinct, or may have it put off till the next tertian period,—may, in short, lose a paroxysm entirely. A fit, for instance, appears on the first day, but on the third it is either not observed, or is indistinct, or does not take place till the fifth, which is the next legitimate tertian period. We know that circumstances of this kind are not uncommon, and that favourable weather, a strong moral stimulus, or some similar powerful agent, will not unfrequently retard a paroxysm, or entirely prevent its appearance. In either circumstance the quintan period will be formed; and this, we conceive, to have taken place in the few cases in which the quintan ague described by authors has been observed. The same observations will apply to longer periods of paroxysmal accession; and the septan, octan, and nonan agues, may be, without much violence to nature, or any practical error, viewed as tertian or quartan agues, in which the accessions are disturbed or retarded, and the paroxysms modified.

The description which I have given of the distinguishing characters of the three chief sorts of intermittent fever, will communicate an idea of their ordinary nature and progress; and the circumstances which I have remarked, as more or less peculiar to each, will be useful in showing their specific or individual distinctions. The history of these diseases, however,

still comprehends many circumstances which require to be noticed, in order to complete our account of them; and, as these circumstances are more or less common to the whole tribe (*genus*), I shall, in my future observations, understand, that what I say is to apply to them in general, unless where the contrary is expressly stated. The circumstances to which I allude may be referred to the following general heads.

II. The modifications which the symptoms of Intermittent Fever, or which the morbid process constituting intermittent fever is found to undergo in its course and termination.

III. The etiology and generation of Intermittent Fever.

IV. The treatment of Intermittent Fever.

§. II. MODIFICATIONS IN THE COURSE AND TERMINATION OF AGUE.

A. The morbid process constituting intermittent fever is liable to modification in different ways; but, in general, they may be classed under two general heads,—1st, Affections necessarily connected with the aguish or febrile condition; 2d, Affections accidentally connected or superadded to the febrile condition. It may not, perhaps, be always easy to draw the line of distinction between these two orders or modifying circumstances; but we trust that this arrangement will be more suitable than any other, and we shall endeavour, in enumerating its subdivisions, to adhere as closely as possible to the exposition of the true phenomena of those variations.

a. Authors have noticed various affections which modify or *mask*, as some have expressed it, the ordinary symptoms of intermittent fever. These affections are, in general, such as indicate more or less irregularity in the circulation motion, sometimes amounting to local inflammation, deranging sometimes the nervous system, and the functions of sensation and locomotion, and not unfrequently disturbing secretion and those processes which depend on circulation. As these symptoms always tend to disguise or mask the original and genuine type or process of ague, the fevers in which they take place have not improperly been named Masked Fevers or Malignant Agues (*Febres larvatae*, *Febres perniciosae*, *I. malignae*). The principal forms under which they have been observed are the following;—1st, Symptoms of local inflammation; 2d, symptoms of inordinate local determination of blood; 3d, symptoms of affection of the nervous system; 4th, symptoms of deranged secretion.

1. The inflammatory affections incident to ague have been found to be one or other of the following :—*Encephalic or Phrenitic, Pneumonic, Pleuritic, Hepatic, Splenic, Dysenteric, and Arthritic.*

a. In Encephalic or Phrenitic ague the paroxysm is distinguished by intense pain of head, furious delirium, reddish injected appearance of the eyes without lacrymation, hard, full, and quick pulse, and swelling of the jugular veins, which are afterwards followed by convulsive motions, coma, and death. In some instances, pain at stomach, bilious vomiting, and erysipelas of the scalp, appear, and are also followed by convulsions, coma, and death. Examination has shown, it is said, gangrenous inflammation, that is, much distension of vessels with dark blood of the cerebral membranes, and distension of the cerebral vessels with the same (Hildenbrand, 87). To this may be referred the form termed Egyptian Star-stroke or Sun-stroke, *coup de soleil* (*Siriasis Ægyptiaca*), which appears to be the most violent degree of the disease. Encephalic or phrenitic ague, which is seldom, almost never, seen in the quotidian, is not unfrequent in the quartan or its varieties, and is very common in the tertian or semitertian, especially in warm seasons or countries.

This form of ague is common in tropical countries,—for instance, the Spanish Main and the West India Islands; and it is important for the practitioner to be aware of the fact, that it has a peculiar tendency, unless treated with the greatest promptitude and judgment, either to kill outright, or to leave the patient so much impaired in intellect, as to remain for life in a state of incurable imbecility. This tendency of ague to degenerate into mania after a few paroxysms, and thence into idiocy, was observed by Sydenham, who ascribes it to the protracted duration of the disease, the duplication of the fits, and repeated excessive evacuations.* It was, in like manner, observed by Dr Charles Irving in the Spanish Main, and by Dr Mosely in the convalescents who returned from the expedition of San Juan in 1780. This result the latter author ascribes to the unseasonable use of Peruvian bark; and perhaps this medicine, by augmenting the congestive state of the vascular system, might be accessory to such an effect.† But while it is

* Opera Universa, sectio i. cap. v. p. 65, 66.

† Treatise on Tropical Diseases, section iii. p. 191.

admitted that this state of the mental faculties also appeared during convalescence, and it is further known that it occurred in instances in which bark was not given, it must be inferred, that it is one of the natural tendencies of the disease. Nor is this wonderful in an affection in which the cerebral vessels are greatly overloaded with blood, and continue so long in that state, as to lose probably their natural tone and contractile powers.

β. Pneumonic ague is attended at each paroxysm with oppression of the breast, anxiety, difficult breathing, cough, generally with a purple appearance of the countenance, and the other marks of pulmonic inflammation. In some cases a convulsive cough, with sonorous or hissing breathing, are the only marks which denote the tendency to pneumonic affection. γ. If to these symptoms be added a pungent pain of either side, and hard strong pulse, there is reason to think that the pleura is affected; and the disease is what has been known by practical authors under the name of periodic or aguish pleurisy. It is most frequent in the tertian, especially during cold moist weather, or when the autumnal tertian has been prolonged to the winter season. This is the pleuritic tertian of authors.

δ. In some agues the paroxysm is attended with pain in the right hypochondre, which is afterwards almost constant,—at least is felt during the intermission, and aggravated in the fit,—and is attended with weight and swelling of that region, with bilious vomiting or stools, and other symptoms indicating affection of the liver. It may occur in the tertian, especially when that disease is tedious or inclined to remit, as in warm climates; but in temperate countries it is most common in the quartan, and constitutes the hepatic quartan of authors. When these symptoms continue long, the liver is found to have extended into the epigastric and left hypochondriac regions, and to have become so much enlarged, as to be felt by the hand, or seen by ocular inspection. It is one of the most common forms of *ague-cake*. The morbid change thus occasioned in the liver appears, in general, so far as can be judged from dissection, to consist in mere enlargement or swelling, dependent on chronic inflammation of its substance.

ε. The symptoms of splenic ague are precisely those which indicate splenic inflammation in other cases. It is not mentioned as incident to the quotidian or tertian, but it has been

noticed in the quartan as an occurrence not uncommon. It is most frequent in the autumnal months.

ζ. The Dysenteric ague has been considered by some physicians (Hildenbrand, 102), as an intermittent, with derangement of the secreting function. The propriety of this view will, of course, depend on the truth of the opinion regarding the pathological condition by which dysentery is distinguished. To me it appears, that dysenteric ague is more justly referable to this head, as the discharge and extraordinary secretion are dependent on *Enteria* or *Dothinenteria*, or an inflamed state of the villous surface and follicles of the intestines. Its alleged affinity with the choleric form, to be afterwards noticed, will not affect the truth of this view; for, whether the biliary evacuations be the cause, as sometimes happens, or the effect, as may likewise occur, or be a simultaneous and coexistent phenomenon, the essential and characteristic nature of this disease is the same inflammatory condition of the intestinal mucous surface. It is accompanied, besides the ordinary discharges, with occasional hiccup, restless jactitation, parched rough tongue, and saffron urine. The stools are at the beginning bilious, afterwards mucous and bloody, with gripes, tenesmus, and frequent deep-seated abdominal pains. The œsophagus is said to be eroded (Burserii, Inst. clxiii.) by the matters vomited; but this is perhaps the mere continuation of the diseased process going on in the intestinal tube. Its course, termination, and degree of danger, depend entirely on the dysenteric affection.

This disease, which was described by Willis (*Pharmaceutice Rational.* sect. iii. cap. iii.) in 1670, and Morton (*Pyretolog.* cap. ix.) described and seen by Torti and Galleazzi, and noticed by Cleghorn and Lautter, is referred by Cullen to the head of symptomatic dysentery, (*D. febre intermittente comitata*). It is principally incident to the tertian, and occurs especially in autumnal agues, or during the moist weather which follows the sultry summers of the south of Europe. The bloody (*subcruenta*), or atrabiliary tertian, *T. Atrabiliaris* of Torti, is either a variety of this form, or belongs to the disease named *Melæna*.

η. An Arthritic tertian is mentioned by Morton and Lautter, and well described by Borsieri (clxxxxii). It is characterized by pains in the joints during the paroxysm, first heavy, tense, and compressive, afterwards darting and tearing,—imitating gout or rheumatism.

2. In agues with inordinate local determination or congestion of blood, the symptoms vary according to the part which becomes the seat of the morbid state of the capillaries. In some instances, indeed, it may be difficult to say how far this gives rise to the symptoms;—but as the phenomena and examination after death show this state to be in general a fact, I shall enumerate its varieties in the following order.

Morbid congestion or distension in the head or brain; morbid distension in the lungs; morbid distension in the stomach and intestinal tube; and morbid congestion in the kidneys, the liver, or the spleen. In some cases even the *uterus* is said to be affected.

α. I have already mentioned the phrenitic modification of ague, as attended first by symptoms denoting cerebral or meningeal inflammation, and, finally, by those signs which indicate suspension or abolition of the functions ascribed to the brain. It is probable that this is the course of phenomena in many of those cases which are attended by a lethargic or comatose condition. But there is certainly an ague which is attended with the terminating without the incipient symptoms of cerebral irritation, or at least in which the lethargic or comatose condition comes on, without any unusual phenomena to indicate previous irritation, more than arose from the febrile motions. To justify our referring it to this head, therefore, I have only to say, that its phenomena during life, and the traces of its action after death, show that it depends on a peculiar accumulation of blood in the brain, producing not inflammation primarily, but mere stagnation in vessels, and consequent compression, or effusion, if it be long-continued, and consequent compression. The observations recorded in authors show, that it may vary in degree and in the manner of its approach, and that the whole almost of the aguish symptoms are completely disguised or concealed under the usual phenomena of apoplexy. In a slight degree the patient is perhaps merely lethargic or drowsy during the paroxysm, and can still be roused from this condition by the efforts of the attendants. After it has recurred in this manner once or twice, the insensibility is more complete, till all the symptoms of perfect apoplexy are induced. In other instances, after a dull heavy pain of the head, dizziness, impaired or lost vision, and generally some affection of the urinary secretion, such as strangury, turbid or

coated urine, the individual falls down suddenly with the mouth open, eyelids fluttering, and other symptoms of relaxed muscles, and continues during the rest of the paroxysm in a stertorous sleep. In some instances this ceases spontaneously, but in others it terminates in death, unless the paroxysm, which is generally protracted to twenty-four hours, and follows the tertian type, is finished. When the comatose condition goes off spontaneously, or even at the end of the paroxysm, it generally recurs according to the ordinary revolution of the fever, and has been observed most frequently in the tertian, though it is not uncommon in the quartan.

This is in various degrees the Sleepy Quotidian, (Car. Piso. Obs. 175); the sleepy, (Werlhof de Feb. p. 6); lethargic, (Torti); hemiplegic, (Werlhof, 6); carotic, (Lautter, 1, 7); and apoplectic, (Morton); tertian, and the comatose quartan, (Werlhof, Carl. Piso) of sundry practical authors; and is the disease which has been carelessly named by some Italian physicians (Baglivi, Lancisi,) epidemic apoplexy, (*Apoplexia febricosa*, *Carus febricosus*.) It is the ague which is epidemic, or rather endemial; and the apoplectic phenomena are quite secondary, and dependent on the febrile motions. These soporose or comatose agues may be sporadic or general,—prevail mostly in the summer or autumnal months, in rather warm countries, and after a few paroxysms, sometimes the second or third, are very generally fatal. Their mortality, indeed, is so uniform and well-known, that they have been named *deadly* or *death fevers* (Todten fieber) in Germany and Hungary, where they are very common.

They were first observed at Cos and other Mediterranean islands by Praxagoras, the master of Herophilus, (Coel. Aurel. auct. lib. ii. c. 10, p. 97,) at Rome, by Asclepiades, (Coel. Aurel. ibid.); afterwards at Embden by Eugalenus, at London in 1678 by Sydenham, and by Morton in 1680; at Rome and in various parts of Italy in 1694 and 1695, by Baglivi, and by Lancisi the same year, (De Nox. Palud. Effluv. Ima Epidemia, cap. 2. and 5,) at Bagnarea in Etruria in 1707, (3tia Epidemia, c. 4 and 6,) in Switzerland by Zimmerman in 1717; at Hanover by Torti, and in the neighbourhood in 1726 and 1727 by Werlhof, (De Febr. sect. i.) at Minorca by Cleghorn, in 1746, (Diseases of Minorca, p. 173,) at Halle in 1763 by Büchner, (Dissert. Halae, 1763,) and at Strasburgh in 1782

by Kech, (*De Febris Soporosis*, 1782,) by Puccinotti in 1813 and 1821; and by Bailly at Rome in 1820, 1821, 1822, (*Traité Anatomico-Pathologique*. A Paris, 1825.) The cases that have been examined after death show the cerebral vessels to be much distended with blood, sometimes ruptured with bloody extravasation; in other cases the distended vessels are accompanied with serous effusion between the membranes and in the ventricles. In some cases portions of the brain are softened; and in most the brain is much injected. These appearances indicate, as we have said above, that the characteristic symptoms of soporose ague, are unequal distribution of blood, and preternatural accumulation of that fluid in the brain.

β. The same pathological state, assuming, however, a different direction, or another locality of the capillary system, is occasionally remarked; and the hemorrhagic agues are to be considered in the light of fevers characterized by that peculiar state of the vascular system of several textures, which favours the discharge of red blood. To this head, therefore, we refer agues with *hemorrhæa*, *hæmoptysis*, *hæmatemesis*, *hæmaturia*, *menorrhagia*, or other bloody or blood-like discharges. Aguish spitting of blood is not common, unless in those who have got previous affection of the lungs, or aguish catarrh or peripneumony. Vomiting of blood (*hæmatemesis*), is more common, and perhaps the ague with bloody discharge from the intestines, (*T. subcruenta sive atrabiliaris*, Torti), is to be ascribed to the same pathological cause, and referred to the same head. The other aguish hemorrhages or hemorrhagic agues have nothing peculiar.

The petechial tertian has been generally referred by systematic writers to the agues modified by cutaneous eruption. It is, however, to be observed, that it is much more justly arranged under the present head, as it is evidently allied to the varieties now enumerated. The petechiæ, either alternate or co-exist with hemorrhage from some of the villous surfaces. Analogous to this, we conceive, are the Scorbutic Tertian (Wedel), and Quartan (Bartholin), mentioned by some authors, and which seems to differ not in kind, but in degree, from the Petechial Agues.

γ. To the same head of Agues with local determination, may be referred those which are attended with cutaneous eruptions. Of this kind are the Nettle-Rash, and Miliary Tertians, said

to occur under certain circumstances. Of these I cannot speak positively from personal knowledge, and I therefore refer to the authors who have described them from observation.

δ. The Fainting Ague (*Tertiana syncopalis*, Torti, *Tritaeophya syncopalis*), is the most peculiar perhaps of the whole of the modified or disguised agues. The patient, after experiencing the sensation of a metallic taste in the mouth, is suddenly attacked with pains of the bowels, giddiness, double vision, and hissing or singing in the ears; the face grows pale and cold, the eyes shrink into the orbits, and the patient is sensible of hardly anything for a considerable time. If he attempts to quit the horizontal position, complete fainting takes place, and the patient continues with an imperceptible or very slow, languid, and intermitting pulse, in a cold death-like sweat. After shorter or longer duration, according to circumstances, the patient slowly returns to himself, but continues in a feeble condition with small languid pulse for a considerable time. The paroxysm returns in the same form at the ordinary period, and generally in the fourth or fifth attack, sometimes sooner, destroys its victim.

The fainting ague was observed and described by Al-Rasin, Ebn-Sina, and other Arabians, and more recently by Torti and Lautter.

The phenomena of this modification of paroxysm, with what we know of *syncope* in other circumstances, seem to show that the blood in the vascular system is deficient in quantity, or it is destitute of the ordinary qualities of stimulating the muscular structure of the heart.

3. Under the head of agues with affection of the nervous system are enumerated the Amaurotic, Cataleptic, Hypnoba-tic (sleep-walking), Convulsive, and Tetanic Agues. The first and second are certainly mere varieties of the Carotic or Sleepy Tertian or Quartan; and the third is very probably connected with it, though the pathology of somnambulism is so obscure, that it is impossible to form a positive conclusion on its nature.

The spasmodic affections which occur in ague may be either clonic or tonic, convulsive or tetanic. The convulsive form assumes a great variety of shapes. α. The first and most unequivocal instance which we shall notice is that termed the Cardiac or Cardialgic paroxysm occurring in the tertian. It consists in the cold stage on its termination being attended with an

atrocious pain, which is compared to a *very sharp biting* pain of the mouth of the stomach, and scanty and unavailing retching. If to this are added fainting, small pulse, Hippocratic face, mournful sighs, and occasional shrieks, instead of expiration, life is in danger, and may be extinguished in a second attack. These symptoms are ascribed by didactic authors to spasm of the stomach or its cardiac end. They were seen and described by Torti and Lautter.

β. The paroxysm may be disguised under the form of irregular and involuntary contractions of the abdominal muscles, with violent and obstinate colic spasms of the intestines. These motions are attended with much languor, anxiety, retching (*vomituritis*), small pulse, alternations of burning heat and cold sweat, extreme thirst and dryness of tongue, and sometimes a death-like fainting. This is the Colic Ague, or Colic Tertian, generally fatal in two or three paroxysms. It was seen, accompanied with aphthous ulcerations of the mouth, by Morton, who describes its usual appearance.

γ. The paroxysm commencing in the ordinary way may terminate in hysteric symptoms. This may take place in tertian, according to Wedel, and in quartan, according to Morton.

δ. Another form of paroxysm, the Asthmatic, has been mentioned by Bonetus as occurring in tertian. According to the usual pathological principles of asthma, this would be referred to spasm, either of the muscles of the glottis, or of the intercostal muscles and diaphragm. Unfortunately, the descriptions are not sufficiently precise to enable us to say whether the difficult breathing arose from this cause, or from congestion or inflammation, or any other morbid state.

ε. The modifications already enumerated consist in spasmodic motions of muscular organs only. But convulsive motions seldom occur in ague without some degree of *sopor*, thus forming the Aguish Epilepsy or Epileptic Ague. It has been observed in the quotidian by Baine of Pembroke, in the tertian by Caldera and Lautter, and in the quartan by Scholzius; but is most common in the two latter, and constitutes the epileptic forms of these diseases. It seems in most cases to depend on nearly the same pathological causes as the comatose or sleepy agues, though perhaps operating in a peculiar and different temperament.

ζ. Tetanic symptoms are not so frequently found to attend

agues. A Tetanic Tertian is described by Medicus, and noticed by some other authors, to whom we refer the reader.

4. Lastly, agues may be modified so as to have a remarkable influence in deranging the secreting functions. More extended observation may perhaps show these derangements to be numerous and manifold; but the best example is that of the biliary secretion, to which we must now restrict our observations.

Intermittent fevers, when occurring in autumn especially, are found to be connected with deranged biliary secretion; and this in some instances becomes so considerable as to disguise entirely the characteristic marks of the ague. The paroxysm of such forms is generally introduced, always attended with repeated irresistible vomiting of bile, and copious bilious discharges from the bowels. These discharges are described (Burserii, Inst. clx.) as green (*prasina*), or of the verdigris (*arugo*) colour. From the testimony of Morton, however, there is no doubt that they often assume the serous, or sero-albuminous or rice-water appearance and consistence. They are accompanied with hollow sinking of the eyes, hoarse and clanging voice, incessant hiccup, epigastric anguish, small, feeble pulse, scanty cold sweat of the forehead, and cold extremities, (Burserii, Inst. clx.) This form of aguish paroxysm, which in different degrees is named the vomiting (*emetica*), choleric, or (*cholericæ*, Torti and Lautter,) is very frequent, and speedily fatal. It is found chiefly in the tertian form, in hot, sultry seasons, and in the more southern countries of Europe. It was observed by Archigenes at Rome, Panaroli at Rome in 1601, (*De Epidemia Coelii montis Romæ Dominici Panaroli*), by La Riviere at Montpellier, and by Rhodius at Padua, by Willis and Morton, in 1670 and 1690, in London, by Torti at Modena, and by a physician on the eastern shore of Maryland, quoted by Dr William Currie of Philadelphia in the following terms.

“ I have many times seen the cholera with regular periods like a tertian, and the paroxysm of tertians attended with a cholera. In a few cases I have seen a tertian changed into the dysentery, and dysenteries into tertians; and when one of these has been suppressed, the other has sometimes ensued. I have also been told by other practitioners, that it is very common for dysenteries to put on the form of tertians, and for

the fits of tertians to be regularly accompanied by gripes and stools.”*

b. In the modifications which I have now enumerated, the phenomena of intermittent fever are either completely veiled under the modifying disease, or they undergo a conversion into it. A modification not quite so complete has given rise to a division of *Accompanied Agues* (*Intermittentes vel Febres Comitatae*), among writers both systematic and practical. In these the symptoms of ague are modified or altered merely from their original character without undergoing the complete disguise which distinguished those varieties which have been already examined. The change will be best understood from the characters of the Chill Ague (*Febris Algida*, Torti and Lautter), the Burning Ague (*Leipyrria*, *λειπυρρία* of the ancients), and the Sweating Ague (*Febres sudatoria*, *Elodes et Hydropyretos* of the ancients),—all of which have been considered as accompanied agues (*Febres Comitatae*) by Torti.

a. The first (*Tertiana algida*, Torti, *Amphimerina Phricodes*, Sauvages), is distinguished by an intense and death-like coldness in the beginning of the fit, which, instead of giving way to the hot and sweating stages, continues almost the entire legitimate time of the paroxysm, without increase of temperature or acceleration of pulse; but with anxious breathing, sobbing, and a pale, cold, cadaverous aspect. It declines gradually with a scanty chilling sweat, and after an imperfect intermission, returns not uniformly at the same period, but in most cases fatally.*

β. The second,—Burning Ague (*Leipyrria*, *Tertiana Leipyrria*,—Valcarengi; *Tritæophya Leipyrria*, Sauvages), differs more in appearance than reality from the former. Its character may be said to be defect of uniform temperature during the hot stage. While intense burning heat is felt internally, and the heart and bowels appear to be consumed with fire, the patient is chilled over the surface, or shivers and is frozen with cold in the extremities. It may be combined with the last,—a circumstance which appears to have influenced Cullen in assigning it the same nosological station. (*Synopsis. Tertianæ comitatae. F.*) Of this the *Tritæophya assodes*, seen at Rome by Lancisi, appears to be a variety.

* Historical Account of the Climate and Diseases of the United States of America, &c. by William Currie, Fellow, &c. Philadelphia, 1792, 8vo, p. 234.

γ. Some intermittent fevers, which commence in the ordinary mode, are distinguished by a short hot stage, and pass into a sweating one, which is premature in appearance, long in duration, and excessive in degree. The patient, without being much heated, is almost incessantly bathed in a copious cutaneous moisture, which does not relieve, but rather aggravates the symptoms, and finally, after exhausting and enfeebling, terminates in death in the course of a few attacks. It is common in the summer months in the southern countries of Europe. By the names of Sweating Fever, (*F. sudatoria*), Marsh Fever (*Elodes*), Water Fever (*Hydropyretos*), it was known to the Greek physicians who saw it on the coasts and islands of Greece; and described as the diaphoretic tertian by Torti, who saw it in Italy.

In the two last varieties which are most common in the tertian ague, the disease always tends to the Remitting, Sub-continuous, or Continued form; and in noticing them in this place, I rather comply with custom and the arrangement of didactic authors, than follow the natural delineation of the disease.

c. Agues may be accidentally connected with almost any disease; but the most usual complications which have been remarked by writers are the Scorbutic, Syphilitic, and Helminthic or Verminose. Of the scorbutic I have already spoken (p. 63.). I do not regard the complication with syphilis as anything but accidental. They are of no importance in illustrating the history or pathology of the disease, and they have no influence on agues farther than they could have on any other tribe of maladies. For these reasons they require no farther notice.

I have now enumerated the principal and most important modifications to which intermittent fevers are liable. Some authors have enumerated cataleptic, hydrophobic, nephralgic, metastatic, and even insane (*Quartana amens*, Sauvages) agues; and I doubt not that it would be possible to increase the list very much on the same principle of arrangement and distinction. But I must observe that such forms of fever are mere varieties of those which I have already examined; and my purpose is not so much to enumerate all the possible deviations which have been, or may be observed in this fluctuating disease, but to indicate the most necessary, essential, and important, and to show how they are connected with the varieties most frequent in nature.

B. The modes in which Intermittent Fever may terminate

have been observed to be threefold;—1st, in health; 2d, in death; 3d, in other diseases.

1. Experience has shown that there are certain conditions under which intermitting fevers more readily terminate favourably than under others. These are, α . absence of other disease, dynamic or organic, except the ague; β . a disease depending on slight causes, and sporadic or not endemial; γ . when epidemic, a vernal one; δ . an ague regular, undisguised, simple, and either of the tertian period or of the quotidian postponing or retarding the paroxysm; and ϵ . lastly, youth and a system readily influenced by remedies.

These conditions being premised, it is further observed that agues terminate favourably chiefly in three modes; 1st, spontaneously, or by the efforts of nature, as it is said; 2d, by a favourable disposition of circumstances; 3d, by art. 1. The system appears to possess a natural tendency to interrupt or destroy the train of morbid phenomena; and vernal agues especially may disappear spontaneously after the fifth, seventh, or ninth paroxysm in copious sweating and hypostatic urine, or a vesicular or vesiculo-pustular eruption round the mouth and lips. 2. This termination is very much favoured by such external circumstances as warm dry weather, change of situation, or changes effected, either spontaneously or accidentally, in the constitution of the patient. 3. The means of art comprehends the administration of all those agents which can act, or are known to act, as remedies.

It occasionally happens that autumnal agues continue during the winter season with much obstinacy, and terminate in vernal agues, which finally remove the disease entirely. In other instances, after anomalous states of ill health, accompanied with *chlorosis* or *amenorrhœa* in females, and gout, palsy, hypochondriasis, or melancholy in either sex, the appearance of a smart fit of ague is followed by recession of all the symptoms; and after a few paroxysms the patient is restored to health. Such agues have been denominated *depuratory* (*febres depuratorie*), from a power which they are supposed to possess of purifying the system.* The principle of their agency seems to be that of derivation or counter-irritation.

It is almost superfluous to say that the favourable termination may be anticipated when the fits continue or become re-

* Metzler uber die Fortheile des Fiebers in langwierigen Krankheiten.

gular and milder, and when the different functions are tending to their natural state.

The fatal termination of ague is favoured by old age, disease, dynamic or organic, chagrin, mental distress, or any thing that impairs the constitutional powers; residence in a marshy or very noxious district; a summer or autumnal epidemic, combined with a calm, windless, and heated atmosphere; the anomalous, erratic, complicated, or disguised character of the ague, especially when comatose, syncopal, chill, or choleric, or complicated with scorbutic or dropsical symptoms; and lastly, by the improper and unseasonable use of remedial agents.

2*d*, Inspection of fatal cases of ague shows that they terminate in death either by the direct effect of the disease on the constitution at large, or by injury done to some organ, the structure and properties of which are essential to life.

That death may be produced in the first mode is inferred chiefly by negative arguments; because examination in sundry cases does not unfold any local injury or process of disorganization incompatible with the continuance of life. Such cases, which generally terminate during a paroxysm, or soon after it, occur chiefly in the chill and fainting agues, and appear to depend on the shock inflicted on the constitution. Death is said then to be paralytic, an expression not physiologically correct, but perhaps not involving any error sufficiently serious to demand its proscription.

In the greater number of fatal terminations, however, there is reason to believe that mechanical injury of some important organ takes place. The previous examination of the varieties and modifications of ague show that lesions may occur in the brain or its membranes, in the lungs or in the pleura, in the pericardium, in the stomach, or in the intestines, and in the liver or in the spleen. It is probable, from the cases recorded by Davis and Hamilton of the Walcheren fever, and Marshall of the Ceylon fevers, and also from those by Grottanelli of the Pitiglian and Florentine agues, that neither lesions of the liver nor spleen are very suddenly fatal. The cases recorded by Torti, on the contrary, by Coutanceau (1805), Colombot, (1809), Alibert, Chevassieu d'Audebert, (1811), by Puccinotti, (1824), Bailly, (1825), and Montfalcon, (1826), show that *coma* or apoplectic death, suffocation (*asphyxia*), or peripneumony, or some remarkable lesion of the nutritive function from gastro-ente-

ric or intestinal disease, are the ordinary modes in which life may be extinguished, when the brain, lungs, or intestinal canal are affected by ague. It appears that in general such cases terminate fatally during the cold stage of the paroxysm.

If ague neither retires nor occasions death directly, it almost uniformly terminates in some other disease. In the *first* place, it may, by the duplication of its paroxysms and abridgement of the intermissions, be converted into remittent fever; and this is perhaps one of the most usual terminations, or rather transitions, in summer and autumnal agues. It may terminate also in continuous fever, by the remissions becoming short and indistinct; and in both cases there may be combined varieties of local action. *Secondly*, ague may terminate in actual genuine local inflammation, for instance, chronic inflammation of the liver, spleen, or pancreas, of the stomach or duodenum, or of the intestinal tube, constituting dysentery or aphthous inflammation of the intestinal tube; tubercular disease of the lungs, liver, spleen, or pancreas; chronic *peritonitis* and abdominal dropsy (*ascites*); *pericarditis* and pericardial effusion (*hydrocardia*); general dropsy (*anasarca*); and in sundry undefined dynamic and organic changes of the stomach and intestines, the liver, spleen, and pancreas. To one or more of these morbid changes the symptoms of indigestion, *hypochondriasis*, impaired strength, and general wasting (*marasmus*), which are left after long-continued agues, especially of the quartan period, are referable. *

§ III.—ETIOLOGY.

The Etiology of ague comprehends the enumeration of those circumstances and conditions requisite to the production of the disease, and the inquiry into the nature and characters of that process which has been believed to constitute the several stages of the paroxysm. To the former head must be referred all those agents and circumstances which have been denominated *remote causes*. The latter is a condition of the system, especially of its nerves and blood-vessels, which has been denominated the *proximate* or *pathological cause*.

The Remote causes are naturally distinguished into two ge-

* For a very excellent account of the effects of ague in disorganizing the organs of the alimentary canal as well as the brain and lungs, I refer to the following work. Scientific and Popular View of the Fever of Walcheren, &c. by J. B. Davis, M. D. London, 1810; with those of Puccinotti, Bailly, and Montfalcon.

neral classes; those external to the individual, and those pertaining to the individual.

I. It may be regarded as established by numerous observations, that the only cause external to the individual which generates ague, is some aëriform body exhaled in form of vapour, from marshy or wet ground in the progress of drying. Nothing is more difficult than to specify in definite terms the circumstances essentially necessary to the production of the disease, which does not, it must be admitted, prevail in all marshy districts, nor can always be traced to the vicinity of marshes. I shall, however, state the principal facts which appear to be well ascertained on this point; and in so doing, I understand that they in general apply to the formation of remittent as well as intermittent fevers.

In the first place, agues are remarked to be the disease of wet, marshy districts, and to prevail most abundantly in countries which are low, swampy, and humid. The vicinity of marshes, the banks of great lakes and rivers, where the water flows slowly or stagnates, the outlets of rivers into the sea, the sea-coast itself, especially when alluvial, low, and flat, and extensive flat tracts of wood, in which much moisture is constantly present, the process of exhalation is uninterrupted, and the surface is never dry, are the situations in which intermittent fevers are found to prevail. In this country, the low grounds of Kent and Essex, and the fenny parts of Lincolnshire, Cambridgeshire, and Norfolk, are the situations most productive of ague. On the Continent of Europe, the countries in which agues abound present nearly the same physical characters. These diseases are endemial in Holland, along the whole of its low and level coast, from the islands of Walcheren and South Beveland, at the mouth of the Scheldt, on the south, to Friseland and Groningen on the north. It is almost superfluous to specify the places most productive of this disease; for scarcely a town along the course of the Scheldt, or on the islands formed by its waters, and the whole of the insular tract between the Scheldt and Meuse, can be specified in which ague does not appear annually to greater or less extent. The same may be said of the towns situate on the banks of the Meuse, and on the coasts of the internal seas, for instance, those of Haarlem, Leyden, and the extensive but shallow Zuyder Zee. In France, the aguish districts are the valley of Auge, on the banks of the Dive in Normandy; several parts of the valley of the Seine,

for instance, Paris and its vicinity ; various tracts in the course of the Loire, as the neighbourhood of Tours ; Sologne, a considerable district of the Orleannais, in the department of the Loir and Cher ; Bresse, in the Lyonnois, between the sources of the Saone and the Rhone, Dombes, and Bugey, forming the department of the Ain ; places on the Garonne as Bourdeaux ; and lastly, much of the south coast from the mouths of the Rhone to the district of the maritime Alps. In Italy, the Mantuan and Roman territories, especially along the whole tract of the Pomptine marshes, are very prolific of ague. The course of the Danube in Austria and Hungary, and the Drave and Save in the latter country, have been long notorious for intermittent fevers ; and almost the whole southern coast of Europe, especially at the influx of rivers into the sea, where the coast is low and flat, are more or less infested with these diseases. Even the islands of the Mediterranean are not exempt ; and not only Minorca, Sardinia, and Sicily, are the endemial abodes of ague, but on the coast of the Morea, in the Ionian islands, and almost all the Cyclades, this form of fever is an annual or triennial visitant. In Asia, in like manner, ague is abundant in similar situations ; but the places, with the febriferous powers of which we are most familiar, are the Sunderbunds, and the Delta of the Ganges, an immense flat tract, extensively wooded, and abounding in moisture, and the banks of the Irrawaddy, in the kingdom of Ava. Through the entire course of the banks of the rivers, indeed, in India, and wherever the ground is covered with jungle, ague is frequent, and is the natural product of the soil. Of the African continent we know little ; but enough to prove that agues of very bad type are common along the banks, and at the mouths of the great rivers, for instance, the Senegal, the Gambia, and the Zaire, and where the coast is low, as at Sierra Leone, and the tract from Cape Palmas to the Bight of Benin.

In the northern division of the American continent, agues are also indigenous, and especially along the flat wooded banks of their large rivers. Thus not only are they abundant along the mouths and banks of the Rio Norte, the Red River, and the Mississippi, and its immense basin, traversed by the Missouri, the Illinois, and the Ohio, (Volney, p. 286,) but along the whole tract occupied by the states, as far north as the St Lawrence. That tract consists of an extensive space, chiefly alluvial, comprehended between the Mississippi on the west, the

Gulf of Mexico on the south, the Atlantic on the east, and the Apalachian and Allegany mountains on the north, with a smaller region more mountainous, forming the northern states, and indented by deep marine bays and æstuaries. The southern division, occupied by the states of Georgia, east and west, Florida, North and South Carolina, Virginia, and Maryland, is intersected by numerous rivers descending from the Apalachian and Allegany chains; and the basin of each may be regarded, wherever inhabited, as habitually productive of ague. Between the Mississippi and Chesapeake bay, there are no fewer than nine principal fluvial basins, and about fifteen or sixteen subordinate ones; and along each of these ague is the regular and uniform, and remittent fever the frequent, offspring of the soil. The provinces of Louisiana, indeed, Carolina, Virginia, and Georgia, have long been notorious for agues; and there are few situations in these southern provinces in which agues are not frequent and severe, according to the density of the population. In these districts the rice lands, which are flooded for a large proportion of the season, are observed to be very productive of intermittents. (Linning, Volney, Jackson, Fevers of Jamaica, p. 80.) The same is true of the great rivers of the southern division of that continent; and in Guiana, Demerara, and most of the alluvial coast of Terra Firma, agues are endemic.

In the *second* place, simple moisture, it must be observed, is not adequate to the production of ague. The moisture of the sea, of insular situations, and even of large lakes, does not produce ague. Neither under the Pole, nor at the Tropics, are sailors when on shipboard affected with ague; and it is only when they approach or land on the coast, that they are attacked with this disease. Since, therefore, it is neither cold moisture nor warm moisture that is adequate to the production of ague, and since the surface of the earth, with certain physical characters, is indispensable, it is inferred from the manifest effects produced on the persons of mankind residing in situations of this description, or sojourning in them, that from them some deleterious agent is derived. There is little doubt that if such a substance really exists, it either must assume a gaseous form, or at least must be in the shape of particles so minute, and of such comparative levity, as to be readily suspended in the atmosphere, and wafted to and fro by the cur-

rents of that medium. Inferring the existence and aëriform character of this agent, it has been distinguished among physicians by the name of marsh exhalation (*effluvium palustre*, *gas palustre*), and, in reference to its effects on the human body, *miasma* (*corruptio*, *pollutio*, a *μιασμα* *polluo*). Among the inhabitants of modern Italy, in which districts productive of ague and similar fevers are abundant, they are popularly ascribed to the influence of a malignant or deleterious air (*aria cattiva*, or simply *malaria*); and the latter name has, from this circumstance, been very generally, of late years, employed to designate the unknown aëriform cause of intermittent fever.

But though physicians infer from its effects the existence of this principle, no exact ideas have yet been obtained on its nature, or the element in which it resides, or on the mode in which it is generated. The first and most obvious substance to look for the miasmatic principle is the water of marshes; and this, therefore, has been subjected to much examination.

Marsh water examined microscopically by Leigh, was found to consist of leaves, herbs, flowers, roots, seeds, fruits, insects, and, in short, all sorts of animal and vegetable matter, in a state of decomposition. Volta found the stagnant water of Lago Maggiore in Tuscany to emit bells of air, which burned slowly with a blue flame, and doubtless contained much hydrogen gas; and he obtained from the soft mud of the borders of the marsh, a quantity of inflammable gas, which, though proved not to be pure hydrogen, must have contained a large proportion of that fluid. It was afterwards ascertained that the air-bells of marsh water consist of carbonic acid, azote, carburetted hydrogen, and occasionally oxygen; but abstracting from the carbonic acid, which is found in river water, and the azote, which is also not essential, the only gas peculiar to marsh water, it must be inferred, is carburetted hydrogen.

These researches, however, on marsh water were recognized to be of no avail; and the air of marshy grounds was conceived to be a more proper subject of analysis. The results, nevertheless, were not more satisfactory. The stagnant air of the marshes of the Fort of Fuentes, at the outlet of the Valteline, a place so febriferous that it is impossible to sojourn a single night without being attacked, Gattoni found in 1779, by eudiometrical experiments, to be two degrees better than

that of the Peak of Legnone, one of the Grison Alps, which is ever covered with snow, and elevated above the level of the sea about 2880 yards, or 8640 feet; and the result was the same, though repeated fifteen times, and with marsh air collected from eleven different places. Moscati found that air collected from very insalubrious rice-fields during the night, when they are believed to be most active, when condensed, contained a flocculent supernatant substance of mucous aspect, and emitting a cadaverous odour; and Brocchi, who examined the air exhaled from the most unhealthy soil of the Roman territory, found only in the fluid some albuminous *floculi*, somewhat viscid, but in other respects unknown in their qualities. This investigation was resumed in 1810 and 1811, in the Papal territory, by M. Rigaud de l'Isle, aided by Vauquelin, who found the condensed vapour, though clear and colourless, to contain *floculi* on agitation, and to emit a slight sulphurous odour. Farther experiment showed that it contained animal matter, most of which is separated in *floculi*, from muriate of ammonia and soda, and carbonate of soda. It further appears that the *miasmata*, though void of known odour, possess so much comparative weight, that they cannot rise in the atmosphere without the aid of lighter particles, and they are suspended chiefly by aqueous vapour, from which, however, they may be detached and deposited.

Lastly, M. Julia, who performed in the course of 1819 sixty analyses of the air of marshes, drains, necessaries, stables, hospitals, and cemeteries, arrived at the following conclusions. 1st, The air of these several situations contains the same principles, and in the same proportions, as the purest air of the most healthy situations. 2d, Marsh air contains a principle which eludes the test of the most delicate chemical agents. 3d, Though the nature of the noxious vapour is unknown, there is reason to believe that its pernicious effects depend on a form of vegetable and animal substance in a state of decay, or a solution of these substances in air, or the gases resulting from decomposition. 4th, Experiment has not yet demonstrated in marsh air the existence of azotic gas, carburetted hydrogen, or ammoniacal gas, or any of the gaseous products of decomposition; and if they are present in this vapour, their quantity is too small to be appreciated.

Though I give these results of the chemical analysis of the

marsh air, it cannot be denied that they furnish no useful information either on the etiology or the pathology of ague. We are still left in the dark as to the nature of the febrile exhalation; and all that is left for us to do, is to examine the circumstances under which the disease begins.

In the *third* place, ague does not occur in cold climates or seasons, and invariably requires a certain degree of heat. Ague, it is certain, does not appear within the arctic circle; and it is doubtful whether it appears beyond the 57° or 58° of N. latitude. The only exception to this rule is St Petersburg, in which agues were at one time said to be endemial along the Neva; but where, for a long series of years, they have not been observed. The next place in the northern division of the globe in which they have been observed is Copenhagen, the latitude of which is nearly the same as that of Edinburgh. South of this line they are common; and, as we approach the tropics, increase in frequency. In the Temperate Zone, however, they are confined chiefly to low districts of alluvial country, and are never observed in mountainous regions, where the temperature begins to diminish. The limit of this it is not easy to determine; but it may be inferred, from the facts collected by different observers, that it requires for its production a continuous temperature of upwards of 60° Fahrenheit. When ague appears in elevated situations, these must be still below that line in which the temperature is beneath 58° F. Zimmermann records instances of agues, and occasionally with malignant symptoms, occurring along the margins of the Swiss lakes and pools; but these, he remarks, were confined to the hotter parts of Switzerland; and, wherever the banks of the rivers and lakes become elevated, tertians, he repeats, are less frequent. In the Tyrol, also, where the Adige annually overflows its banks, tertians begin to prevail in May, and compel the inhabitants to retreat to the mountainous parts, where they continue till September. As they are compelled, however, to descend to the harvest, they are again exposed, and generally contract tertians. (A Treatise on Experience, Vol. ii. p. 132).

In India this is still more remarkably evinced. In that country agues prevail not only in the low flat humid tracts along the coast, but even in the hilly districts; and a variety passing into remittent, is denominated the *hill-fever*. As we ascend, however, the air becomes more salubrious; and in the high table-

lands of the Nil-Ghau, and in the Himmalaya range, agues are almost unknown. In like manner, while the Savannahs of America are highly prolific of ague, the hilly and mountainous districts are healthy. Nor is it otherwise with the West India Islands, in which, while the inhabitants of the coast are almost annually attacked by the disease, the mountainous tracts, according to the testimony of Moseley, Jackson, Pinckard, and Hunter, are perfectly salubrious. In such circumstances, there is little reason to suppose that the mountain air is drier than that of the coast; for in all mountainous countries the soil is in general more humid and spongy than the low grounds. But the chief peculiarity appears to be the diminished temperature (42° to 46°), and perhaps the greater prevalence of winds and atmospheric currents.

To the same circumstance of temperature, in all probability, must we refer the peculiar season at which intermittent fevers prevail. In no country in the habitable globe are these fevers prevalent the whole annual period. In the Temperate Zone they attack the human frame less vigorously after the autumnal equinox, and cease to assail it at the winter solstice, so that the only agues which are seen during winter are those which have been contracted previous to the latter period. The space from the winter solstice to the vernal equinox is invariably exempt from intermittents in the Temperate Zone; after the latter period, if the weather be mild and rather warm, they begin to appear in districts favourable to their production, and continue to become more frequent as the summer solstice approaches. In general, after midsummer, a slight diminution in their frequency takes place,—depending chiefly on the presence of rains, or rains alternating with wind. But, as summer gives way to autumn, they become more frequent, and continue to be so till the autumnal equinox is over, after which their attacks diminish in frequency and severity. It thus appears, that the great seasons for the prevalence of ague within the Temperate Zone are from the vernal equinox till midsummer, and from a few weeks after this period till the autumnal equinox. This circumstance has given rise to the distinctions of agues into *vernal* and *autumnal*; and it has been further said, that they are most likely to attack at the period of the equinoxes. This distinction, however, is chiefly applicable in temperate countries; and it is by no means established, that aguish attacks are

most frequent at the equinoctial periods. Their attacks, in short, are influenced not only by the geographical position and physical surface of the country, but by the kind of season, whether dry or moist, cold or warm. In general, as has been already stated, within the Temperate Zone, the midsummer rains give them a temporary check; but the subsequent heat and drought not unfrequently make them appear in autumn in augmented numbers and increased severity.

Within the tropics the seasons, instead of being divided into summer and winter, or hot and cold, consist of wet and dry only. The motion of the earth, combined with its oblique position in its orbit round the sun, causes the latter luminary to appear to move in an oblique direction alternately across the equator, between the tropic of Capricorn in the south and that of Cancer in the north. In the northward motion, the sun entering the constellation *Aries*, crosses the equator on the 21st March, and proceeding northward till he reaches the tropic of *Cancer*, stops on the 22d June, begins to move southward again, crossing the equator on the 22d of September, and proceeding southward till he reaches the tropic of Capricorn on the 22d December, after which he again pursues the northern motion. The two periods at which the sun crosses the equator are distinguished by a remarkable change in weather. Between the beginning of December and the end of February the equatorial sky is clear and cloudless, and with winds from the east, the east-north-east, or north, the weather continues calm and settled. During the whole of this period, also, the Voltaic electrometer remains steadily at 1.7 or 2 lines, and the hygrometer denotes great dryness of the atmosphere. About the first week of March, and in different regions of the tropics between the first and fourth week, the blue of the sky becomes less intense, the stars are veiled by a thin sheet of vapour, the breeze becomes less strong and steady, the electrometer begins to oscillate, the hygrometer moves; and finally, clouds begin to accumulate towards the south south-east, where they assume the appearance of distant mountains, but from time to time detaching themselves from the horizon, and rolling over the sky with a rapidity which indicates the force of the upper currents of the atmosphere. About the end of March the southern region of the atmosphere in the northern equinoctial hemizone, is illuminated by small electric explosions; and the

breeze passes, frequently for several hours together, to the west and south south-west. This is a certain sign of the approach of the rainy season ; and, in no long time, the total disappearance of the azure, the obscuration of the sky, and the expanse of dense clouds pouring torrents of rain, with thunder and lightning, indicate the commencement of the rainy season. These rains, which continue for six weeks or two months without interruption, are denominated the *vernal* rains, especially in the West Indies, where there is occasionally a short tract of hot dry weather in the months of July and August. In other countries, however, of the northern hemizone, the rains continue without interruption from May to October, till the sun has recrossed the equator to the southern hemizone. This is particularly the case in the large basin of the Orinoco, and the smaller ones of the Essequibo, Surinam, and Magdalena, and the whole of that part of South America which is north of the line. In other countries,—for instance the West India Islands,—where these rains succeed a season of dry weather, they are distinguished as the autumnal rains. This course of weather is quite uniform in all those countries which lie within the boundaries of the northern half of the Torrid Zone, and even extends its influence somewhat beyond the tropic of Cancer. Thus not only Central Africa, Hindostan, the Indochinese Peninsula, Mexico, the basin of the Orinoco, and the West India Islands, but the northern regions of Bengal, and the southern countries of North America, present this train of dry and wet seasons. A similar train of weather and season is observed in the countries forming the southern half of the Torrid Zone, with this difference, that the wet or rainy season extends from November to the end of March, (Spix and Martius, vol. i. 264,) and the dry season from April or May till the end of September. This applies chiefly to the south of Africa, the islands of Sumatra, Borneo, Java, and others of the Indian Archipelago, New Guinea, the north of New Holland, and the whole of that extensive tract of South America which forms the great basin of the Amazon, and the smaller ones of the Guripi, the Maranham, and the Paraiba, with the sources of the Plata. In both halves of the Torrid Zone, therefore, we have an alternation of wet and dry seasons corresponding to the summer and winter of the Temperate Zone, which preserves its uniformity, both in character and in degree,

and also in period and duration, with singular accuracy. The only variations are those occasioned by the physical surface of the country, by its insular or continental character, and by its elevation above the level of the sea; and these it comes not within my present plan or limits to consider. It is sufficient to remark, that, in the dry cool season, intermittents are rare within the tropics, unless in low flat districts, as that of Demerara and Essequibo, but they become abundant after the vernal or first rains, and generally continue till past the second or autumnal. It is not, however, in all situations within the tropics that they are thus abundant. While they are rare, as already stated, in the elevated regions, they abound in the whole of those tracts which form the basins of the great rivers. Thus the basins of the Magdalena, the Orinoco, and Essequibo, during the months of July, August, and September, and those of the Amazon and La Plata in December, January, and February, are highly productive of ague.

Even at considerable elevations in these fluvial basins, we find agues and remittents endemic. Thus the banks of the Rio Negro, one of the superior tributaries of the Amazon, those of the Cassiquiare, the anastomotic or divaricating branch of the Orinoco, and the whole of that district, is highly productive of ague and remittent; and it appears that not only temperature, but great stagnation exists here; for the banks are very marshy, and are to be blamed for this effect. It appears to have been in this district, between the 14th and 21st May, that Bonpland, when in company with Humboldt, caught the severe fever which afterwards in June attacked him at Angustura.—(Personal Narrative, v. p. 693.)

On this point, however, it is difficult to establish positive rules. In several of the fluvial basins within the Torrid Zone or on its margins, from particular circumstances, the season of rain is the period of health, and the dry season is that of disease. Thus, in the district of lower Egypt, the dry season is febriferous; and the moment the Nile begins to rise, which is in May and June, is the sign of approaching salubrity. In the basins of the Senegal, Congo, and Niger, on the other hand, and in the Nilotic basin at Berber, the general rule is observed.

In general, within the southern half of the Torrid Zone, when the north winds of December begin to blow, agues become

less frequent, and gradually die away in their attacks in January and February. The principal exceptions to this rule, are situations along the banks of rivers where there are no trees. This fact is demonstrated by the occurrence of agues in almost all situations where settlements or even temporary encampments have been made on the banks of rivers. The sickness of the fleet of Hosier in 1726 before Portobello, that of Vernon's in 1741 at Carthagená, and Moseley's account of the sickness that prevailed among the troops in the expedition to San Juan in 12° north lat. in 1780, afford convincing proofs as to the northern division of the zone; and the accounts of recent travellers tend to confirm the conclusion. As to the southern half of the Torrid Zone, we have similar proofs in the fevers of the Zaire. Of the American division we know less. Rio Janeiro, which is exactly under the tropic of Capricorn, is said, on the report of Spix and Martius, to have no endemic intermittents, (i. p. 167); and this exemption is ascribed chiefly to its temperate climate, and the cool breezes with which it is fanned. It is, indeed, a remarkable circumstance, that the southern half of the American equinoctial region is much less warm than the northern; and though the temperature at Rio Janiero, is 90° F. in the shade, it does not seem to produce that frequency of ague which is remarked in other parts of the tropical regions.

Fourthly, Ague appears in the temperate zones at least to require a certain degree of heat and drought in the transition from humidity. From the facts collected by numerous observers in different countries, it appears that the mere circumstance of moisture is not adequate in the temperate zones to give rise to ague. It is not during rains, or at the exact moment of partial and temporary inundations of rivers, lakes, or the sea-coast, that the ague appears, but some time after these events, when the waters are either receding, or have entirely retired, and left exposed to the rays of a summer or autumnal sun a surface more or less extensive of moist alluvial soil. It is from this circumstance chiefly that it results that even in countries in which agues are endemial, they do not prevail annually to the same extent. Thus in the Netherlands it is chiefly after inundations either of the Scheldt or the Rhine, or some of the numerous canals by which the country is intersected, that agues become general and severe. In like manner, in Hungary,

though agues are at all times endemial, yet it is chiefly after wet seasons, when the waters of the Danube, the Drave, the Save, the Theisse, &c. have exceeded their banks, and inundated the neighbouring level country, that the disease becomes general. Bassora, a populous city at the head of the Persian Gulf on the confluence of the Tigris and Euphrates, is another example of the same fact. Though tolerably healthy at other seasons of the year, invariably after the summer rains have swollen the rivers, and laid the neighbouring country under water, malignant agues and bad remittents become so general as to assume the character of a pestilence. The same may be said of the Gangetic inundations, and those of the Irrawaddy in India, and the floods of several of the North American rivers. The only exception to this rule is that of the Delta of Lower Egypt, which does not produce agues after the subsidence of the Nile,—a peculiarity which is perhaps to be ascribed to the dry, rocky, and sandy nature of the surface of Lower Egypt, and its want of underwood or shrubs, in consequence of which, under an almost tropical sun, and the brisk winds which blow from the north-east and north-west during the months after the inundation, the process of drying advances so rapidly, and so much in concert with that of vegetable growth, that there is no time for the developement of aguish diseases. There is still another circumstance which may contribute in some degree to the same result. As the Nile begins to rise only in June in Lower Egypt, and does not attain its maximum till September, the period of its subsidence is so late that the solar and atmospheric heat cannot exercise much influence on it. The average temperature of the cold season, lasting from November till February, varies from 8° to 10° or 12° Reaumur.

I must add, that even this country obeys the general rule in this respect, that in spring, that is in March and April, when the Nile is at the lowest, rapidly fatal malignant fevers, with remissions, prevail very generally, (Volney, i. p. 213), and occasionally to such an extent that they are then taken for the plague, from which, however, they are altogether distinct.

In the North American continent the febrile season varies according to the southern or northern latitude of the place, and the other physical circumstances influencing the temperature. In the southern provinces of North America it prevails

from the month of April to that of October, and in some years to December. But it is remarkable that the type varies according to the season. Thus, in spring and the beginning of summer it assumes the form of single tertian; in June, July, and August it is most commonly double, (Jackson, p. 305, 306), and, after this period, as the weather becomes cool, it resumes the single type. In the northern provinces, again, while ague is so rare in the spring season that it is almost disregarded, and from May to August is the most healthy season of the year, in August it appears with remittent, and increases till after the autumnal equinox, when quotidians and tertians only prevail, (Currie, p. 233). Quartans are said to be seen in Virginia, (p. 282), though not frequently. From these diseases Lower Canada and the adjacent territories are almost exempt, according to Volney, (View of the Climate and Soil, &c. p. 287). From these several facts it may be inferred, that the solar heat must operate for some time on the moistened surface before the soil is adequate to the production of the disease.

In this manner, also, must be explained the fact, that, so long as the water of lakes, marshes, and pools is sufficient to cover their basins, no fever arises from them; but as soon as either, by the progress of evaporation, or the successive deposition of new alluvial and other matter, the surface of this deposit is exposed, agues are periodical, fevers become frequent. Thus, Senac records an instance of a city being long healthy, notwithstanding that there was near its walls a deep lake, in which, for the space of forty years, all sorts of filth and impurities had been accumulated. The moment, however, that the mass of these matters, by their increase, had reached the level of the waters, a violent epidemic fever broke out, and committed such ravages that the mortality of the town was raised from 400 to 2000 annually.

In the *fifth* place, I have to observe, that the existence of a marsh or swamp, properly so named, is neither adequate nor necessary to the production of ague. Many parts of Scotland and Ireland, which are occupied with bog or marsh, are completely free from these fevers; and it has been supposed that the peat or moss with which these bogs abound possesses some property which counteracts the formation of ague. "The exhalations from black peat moss," says Dr Bisset, "are not productive of intermittents, at least in high moors, under a

clear sharp air." (273). The effect of the sharpness of the air in this country cannot perhaps be denied; but it must have little influence in such a latitude as that of Virginia. Now it is a remarkable fact, that, though the provinces of North America, especially North and South Carolina, and Virginia, abound with ague, yet that disease is never seen among the inhabitants of the country near the Dismal Swamp, a moist tract of 150,000 acres, on the frontier of Virginia and North Carolina, and not far from Norfolk, on the banks of the Apamaton, (Weld, chapter xiv.) We learn from Weld that this immense tract is covered with trees, and abounds with water, which appears the moment the shallowest trench is dug. This water is brownish-coloured like brandy, but quite clear, and not unpalatable. The colour is ascribed by the inhabitants to the roots of juniper; and the water is said to be diuretic.

It is also remarked by Dr Tilton, that Lewes, the county town of Sussex, on Cape Henlopen in Delaware, is so salubrious, that not only are the inhabitants the longest lived in the state, but sickly persons, with enlarged spleens and obstructed viscera (*emphraxis*), from repeated obstinate fevers, are speedily restored to health by residence in that town. Yet the Cape is perfectly surrounded with marshes. Bombayhook, also, which is surrounded with marshy ground, is, nevertheless, next to Lewes, distinguished for the health of its inhabitants. From these facts Dr Tilton infers, that marsh *miasmata* will not altogether account for the harvest agues of the United States, (Currie, p. 211 and 218).

I must further notice, that, on the influence of stagnant water and marshy soil, a good deal of misconception prevails in associating, especially with the usual appearances of our localities, the idea of deleterious qualities. "The green mantle of the standing pool" is never beheld without suggesting the idea of insalubrity and disease. This ominous covering, however, is merely a species of *conferva* (*C. jugalis*), completely void of direct noxious qualities, and which thrives in this situation purely because a motionless watery surface is necessary to its fructification and propagation. The water itself in which it may vegetate may be, and often is, perfectly pure; and so long as the water is sufficiently abundant to enable the plant to live, no bad consequences ensue from its presence. Subsequently, however, when the water, stagnant and exposed to

solar heat, is evaporated, and the saturated soil begins to dry, if the exsiccating process advances slowly, and continues long, the miasmatic principle is generated, and, under favourable circumstances, afterwards to be noticed, may give rise to disease.

From observing the impenetrable forests of mangroves and avicennias, (*Rhizophora mangle*, *Avicennia nitida*), (*Conocarpus racemosa*), (*Gomphrena flava*), and similar plants with which many of the coasts of the New World are surrounded, and the rapid alternate growth and decay which the plants of this family undergo, Humboldt is disposed to attribute to their presence much of the febriferous air with which the towns of Equinoctial America are afflicted. These plants, by the prolific manner in which they spread along a coast, and interweave their tangled roots and branches, which are on the coast alternately below water, and exposed to the fervid rays of the tropical sun, are thus imagined to be in a state of constant alternate growth and decomposition. The bark and wood of these trees contain a considerable quantity of tannin, combined with gelatin, according to Humboldt; and the elementary decomposition of these substances, he infers, is a febrile source of insalubrity to the neighbouring atmosphere, (Personal Narrative, iii. p. 190 and 372, &c.) These views, which have been still further illustrated by Dr Wilson in his explanation of the origin of yellow fever, (Memoirs of West Indian Fever), are, perhaps, to a certain extent, well-founded; and it is matter of fact, that all the rivers of Africa whose banks are occupied by mangroves and avicennias are exceedingly febriferous, and almost unnavigable. While, however, it must be admitted, that these plants contribute to render the shores of tropical countries insalubrious, it must also be observed that fevers and agues prevail where no mangroves are seen, and, in truth, where no vegetable matter is produced.

Conversely, in the *sixth* place, agues prevail in situations where no marsh is visible. Though it was at one time imagined that marsh exhalation is the sole cause of ague, it must, nevertheless, be remarked, that instances have occurred to respectable observers of agues taking place in situations in which they could not be traced to the influence of marsh exhalation. Bisset, for example, states that in 1759 vernal agues were abundant in the dry and elevated parts of Cleveland in Yorkshire, which is generally regarded as a very salubrious district.

Townsend found tertians in the Sierra Morena, where there were no marshes in the vicinity; Irvine represents the *fiumari*, or dry channels of brooks in Sicily, to be highly productive of ague and remittent in that island; and Willaume and Fergusson inform us that fevers prevail in many places in which nothing but dry rocks with pools of water, appears. Dr Jones of Philadelphia and New York observed agues and remittents to be very general in New York after the autumnal equinox, when the season has been rainy, though there are no sources of marsh *miasmata*, neither marshy grounds nor ponds of standing water within its vicinity. "About a mile above the city there is one pond, from which the city is supplied with fresh water; but it is always pure." (Currie, p. 55.)

In most of these situations it is found that the surface is porous and penetrable, or very retentive of moisture, and either takes a long time in undergoing the process of desiccation, or is in a state of alternate solar desiccation and humid imbibition. Of this character are many of the most sickly and febriferous districts in Europe and America. Thus, in the Roman territory, in the Maremma, and various tracts in Italy, the meadows which are most prolific of ague cannot be said to be marshy, and indeed present no appearance of marsh. In most of the newly cleared tracts also of North America, though there is no evident open marsh, there is an infinite prevalence of aguish sickness. In many parts also of Spain, especially towards the southern coast, in which the vigour of the vegetation is extreme, though there is no marsh, agues and remittents are the native product of the country. In each of these cases the circumstances of the surface are nearly the same. A rich alluvial soil, imperfectly cultivated, and not adequately exhausted by the process of vegetation, presents a surface in which the solar heat operates so energetically as to divert that vigour which should be employed in the formation of plants and shrubs into a new material, capable of exercising the most deleterious influence on the human frame.

These views have been carried to a still greater length, and illustrated more forcibly, by the observations of Dr Fergusson, Dr Joseph Brown, and Dr James Ranken. The first author has clearly proved that not the marsh properly so called, but its drying and dried margins, and all dry porous soils in which watery fluid may be readily evaporated, are the genuine sources of miasmatic exhalations; that putrefaction neither takes place

nor is requisite for the formation of the marsh poison; and that all that we know of this mysterious principle is, that it is produced at a highly advanced stage of the drying process, and that its activity is influenced by the character of the season, the moisture, the temperature, and the ærial movements of the atmosphere.* Dr Brown has also agreed that the fact of the general prevalence of ague and remittent in the province of Estremadura in Spain, where the flatness prevents subterraneous drainage, is sufficient proof of the independence of those diseases on the presence of a genuine marsh.† Dr Ranken in like manner remarks that, in the most deadly tracts of the Nepaul and Malwa forests, there are neither swamps nor perceptible moisture. The hot season, which in other parts of India is generally that of health, renders these woody tracts noxious and febriferous in an extreme degree, probably from the production of the febrile principle during the slowly and imperfectly drying process, after the less rains which fall towards the close of the cold season.‡

On the influence of soil, our information is rather contradictory. The general opinion, that an alluvial surface, that is, one consisting of the *debris* of mineral, vegetable, and animal matters intimately blended, and more or less susceptible of humid imbibition and percolation,—is the most favourable to the production of intermittent fever, is doubtless confirmed by the usual localities in which the disease prevails. It is nevertheless clear that ague is not the exclusive product of such a soil. Dr Fergusson states that ague and remittent fever prevailed very extensively in August 1794 in the British encampments of Rosenthal and Oosterhout, in South Holland, where the soil was a level plain of sand without vegetation, except a few stunted heath plants, but extensively percolated with water, not putrid, but clear and potable. The Alentejo land on the side of the Tagus, which is also a sandy level flat, is in like manner extremely productive of autumnal agues; and the promontory of Dungeness, an extensive bank of dry loose open gravel, was in the dry summer of 1807 extremely productive of fever to the troops quartered in the barracks and fort.

Nor are rocky districts even exempt from the disease. Not

* Transactions of Royal Society of Edinburgh, ix. Art. xx. p. 273.

† Medical Essays, &c. London, 1828, p. 33, and 39.

‡ Medical and Physical Transactions of Calcutta, iii. p. 320.

only are such places as Ciudad Rodrigo, Gibraltar, and Malaga febriferous; but the rocky shores and islands of the Mediterranean, for instance, Minorca, Sardinia, Sicily, Cephalonia, and all the Cyclades, abound as much in miasmatic fevers as the most level parts of Holland; and the West India islands, most of which are coralline rocks, are the native soil of these diseases. This febriferous property has been attributed, not entirely without reason, to the presence of calcareous strata, which are certainly more loose and porous than most others, and are remarkable for being traversed by fissures and cavities, which often contain water, and through which that fluid may always percolate with more or less freedom. The property of producing febrific *miasma* even is not confined to the coralline and secondary, or transition limestone, but is seen in the primary, as at Gibraltar, and in various towns in the Maritime and Helvetian Alps. Of the other transition rocks, however, we know nothing satisfactory.

Another kind of soil highly productive of ague, is the argillaceous, which is extremely retentive of moisture, and is therefore difficult to be drained and thoroughly desiccated. No district, perhaps, is naturally more productive of ague in this country than that of Middlesex, Essex, Surrey and Kent, a tract which, constituting what may be denominated the basin of the Thames, consists almost entirely of clay, and is in almost all its parts naturally more or less productive of ague. It is indeed true, that by draining, embanking, assiduous cultivation, and improved roads, much has been done to deprive this tract of its original febriferous properties; but the persistence of ague in many parts, especially along the banks of the Thames and Medway, and their tributaries, and also on the sea coast, are still obvious proofs of the original qualities of the soil.

It seems to be chiefly owing to the same circumstance that East Lothian in Scotland was at one period productive of ague, and is now, under the influence of the most perfect and elaborate system of cultivation, entirely exempt from that disease. The soil is chiefly a tenacious clay, in some spots alternating with banks of sand, or loose gravel,—all resting on a substratum of limestone, sandstone, or bituminous shale, covering coal beds of considerable extent; and the whole country is so flat and level, that in many points the streams and rivulets flow slowly or stagnate entirely, and in some spots there are still

distinct marshes. The surface was at one time so productive of ague, that it was quite an understood thing that the reapers were to be attacked by the disease; now, however, in consequence of the perfect tillage, and the numerous tracts of wood with which the country is covered, the disease is quite unknown. The cultivated surface prevents the generation of *malaria*; and the trees must intercept its influence if generated.

It is not, however, annually that agues prevail, even in miasmatic districts; and the concurrence of a certain state of the atmosphere and a certain train of weather appears to be necessary to the general developement of the disease. It would lead me into a field too extensive, and perhaps presenting materials too uncertain and fluctuating, were I to consider all the circumstances on which this periodical prevalence of agues depends. Some of them may be conjectured from the facts already adduced regarding the influence of heat, drought, humidity, &c.; and unfortunately it is to conjecture chiefly that in this particular our knowledge is limited. The absence of aërial currents is also favourable; and hence in seasons when there are no winds, agues are generally, other circumstances being equal, abundant. The influence of the windless state of the atmosphere is demonstrated not only in the greater prevalence of the disease in seasons undisturbed by winds, but in its temporary cessation at the period of the autumnal equinox, which is generally accompanied with boisterous gales and tempestuous weather.

It must be observed, nevertheless, that though winds by their evaporating and dispersing power appear to impair and annihilate the operation of the miasmatic principle, in certain situations they contribute to its operation. Of this a remarkable example is given by Lancisi, in the instance of thirty ladies and gentlemen who had sailed to the mouth of the Tiber on a party of pleasure, and of whom, in consequence of the wind shifting suddenly to the south, and thereby blowing over a marshy tract of land, twenty-nine were immediately attacked by tertian ague. In the same manner, Humboldt informs us, that the town of Cariaco is afflicted with intermittents by the north-west winds conveying to it the miasmatic emanations of the Laguma of Cãmpoma. (Personal Narrative, iii. p. 188.) It is also observed by Mr Boyle, in his ac-

count of the intermittents and remittents of Free Town in Sierra Leone, where he states these diseases become numerous and frequent after the descent of the first rains, when the winds, which are then north and east or north-east, waft from the Boullom shore, or the north bank of the Mitomba, a copious supply of air charged with vegetable and animal *miasmata*. The direct agency of the winds in conveying these products is remarkably demonstrated by the fact, that the moment this shore becomes completely flooded, these diseases become less numerous.

From the whole of the facts and considerations now adduced, in conclusion, I think it may be justly inferred, that, while the surface of the earth is desiccated chiefly in two modes, either by direct solar heat, or by the successive transition of currents of warm air over it, and, in general, by both combined, wherever the former mode of desiccation predominates over the latter, agues and remittents, and similar fevers, will prevail. Desiccation by solar heat alone, or principally, I infer, is extremely productive of the febrific poison; and wherever this process has attained a certain stage, if human beings are exposed to it, they will infallibly be attacked. It cannot be too frequently impressed, that neither what is in common language called a marsh, nor marshy air, is requisite to produce fever; and that any surface which has been previously moistened, and which, like calcareous or coralline rock, sandy soil, or argillaceous matter, may retain moisture, and is then subjected to the desiccating process by means of the solar rays, will at a certain period of that process give rise to fever. In this manner, perhaps, are we to explain the fact mentioned by Dr Bisset, that in 1759 vernal agues were abundant in the dry and elevated districts of Cleveland in Yorkshire, which is regarded generally a very salubrious situation.

In situations, on the contrary, in which desiccation is accomplished chiefly by the successive transition of aërial currents, agues are much less likely to prevail; and if these currents are so frequent and considerable as to amount to breezes or winds, they either prevent the generation of the febriferous principle, or they dissipate it as rapidly as it is produced.

Of other causes appertaining to individuals, they are in general such, that, by their operation on the living body, they cause a degree of weakness or loss of power in some of its

most essential functions. More particularly, they may be referred to whatever diminishes the energy either of the nervous system, or of the entrophic or nutritive functions. Among the former causes may be ranked exhaustion, resulting from debauch or intoxication, extreme and long-continued muscular exertion, inducing fatigue, excessive venery, night-watching and loss of sleep, however induced, long-continued and excessive exertion of the mental faculties, the depressing passions, as grief, despondency, anxiety, or any form of mental distress. Among the latter may be enumerated, excess in eating or drinking; or the reverse, as unusual abstinence or insufficient nutriment, especially with great or long-continued bodily labour; whatever diminishes the energy of the circulation, especially of the capillary system, for instance cold, especially after great heat, for instance nocturnal dews, after the sultry heat of summer or autumn in marshy countries, extreme heat, fatigue, excesses of every kind, especially in venery, excessive evacuations, and fits of passion.

II. On the subject of the proximate cause of intermittent fever nothing satisfactory has yet been adduced. The question resolves itself into that regarding the proximate cause of fever generally, and the particular mode in which this is produced by the application of the remote causes. Of the former we know nothing very accurately; and we must be satisfied, after all the unavailing attempts made by physicians, with endeavouring to ascertain what is the state of the nervous and vascular systems during the process of fever.

The primary and initial action of fever is believed to be demonstrated in the nervous system; at least, it has been supposed impossible to account for the sudden appearance of those sensations of lassitude, languor, and epigastric weakness and anxiety, without supposing an affection of this part of the animal economy. It may be justly doubted, nevertheless, whether this is any thing else than a convenient assumption to explain what is otherwise very obscure and incomprehensible. The nervous system consists of the brain, spinal chord, and nerves. But there is no reason to believe that in the beginning of fever there is any affection of the brain or spinal chord, further than is seated in the blood-vessels of these parts, in common with the capillary system at large; and it may be doubted even whether there is any peculiar or specific affection of the ner-

vous chords, branches, and extremities. Hildenbrand and several other German physicians contend strenuously for the influence of the gangliar-splanchnic portion of the nervous system, and ascribe to this the sudden simultaneous affection of the cutaneous and mucous surfaces. But while I admit the anatomical fact of the minute distribution of nerves to these surfaces, especially to the gastro-enteric, I do not perceive how that can account for the incipient motions of fever on these two surfaces, more easily than by referring them to the blood-vessels exclusively. It might even be argued with perfect justice, that the cutaneous and mucous surfaces themselves possess such organic properties as dispose them to manifest, in their vascular system at least, the first traces of febrile motion. But in whatever mode this takes place, whether through the medium of the nervous system, or directly by the vascular or organic constitution of these textures, we neither know, nor have we any means of determining.

One point may be regarded as ascertained with considerable accuracy. The primary effect of fever is sedative and destructive of the energy of the capillaries and exhalants. When the process of fever is established, it is seated evidently in the minute net-work of vessels denominated the capillaries, and in those exhalants which open in the several membranes and organs. Nor is this action, whatever it be, confined to one set of capillaries to the exclusion of others. It is seated neither in the vessels of the brain and spinal chord, as maintained by Ploucquet, Clutterbuck, and Mills, nor in those of the lungs, nor in those of the alimentary canal, as asserted by Broussais; but it is diffused over the whole minute net-work of the aortic and venous branches of the capillary and exhalant system, in every texture, and in every organ. The justice of this conclusion is so clearly established by the phenomena and progress of intermittent already delivered, that it is superfluous to dwell on the subject, and if I did, I should have to repeat many of the facts already enumerated in the nosography.

But while I maintain that the febrile process is a general affection of the capillary system, this does not exclude the more local and peculiar affection of particular parts. While the whole capillary and exhalant system is generally affected, in some instances, and in certain epidemics, there is a more decided affection of one set of capillaries than of others. Thus,

in one case, or class of cases, the capillaries of the brain may be most affected; in another those of the lungs; in a third those of the stomach; in a fourth those of the liver; in a fifth those of the intestines; and in a sixth, perhaps those of the urinary organs. In such instances of local affection, though all the capillaries share in the general disorder, they are in general less affected as those of a particular organ are more so.

The exact nature of this vascular affection is altogether unknown. I shall not revive the forgotten and exploded dreams of Hippocrates, Praxagoras, Galen, Aretæus, and the whole tribe of speculative, though ingenious, writers who have advanced their respective hypotheses; the acid and alkaline fermentations of De Le Boe, Willis, and Etmuller; the viscosity of the blood imagined by Boerhaave and Bryan Robinson; the vitiated bile of Senac, and the corrupted gastric fluid of Sennebier, or the grosser fancies of Linné and Werlhof; the former of whom ascribed ague to argillaceous water, and the latter to atmospheric air mixed with the blood. The spasmodic constriction of the exhalant system, to which Cullen, in imitation of Hoffmann, attributed the phenomena of fever, is part, but not the whole, of the process; and though itself in some sense a matter of fact, is nevertheless strangely connected with matters of opinion. The impurities of the first passages, alleged by Selle, may be a fact,—but as such is inadequate to explain the phenomena, which, it must be argued, do not in the majority of cases follow such a cause. The sthenic and asthenic states of Brown; the quiescent and active states of Darwin; and the sthenic and asthenic periods of Giannini, though indicating facts, furnish no intelligible explanation of the concatenation of phenomena. By combining with his general doctrine of inflammation of the nervous system the idea of the *vegetative*, that is the *organic*, process, being universal and periodical, Reil accommodates his views with phenomena, without demonstrating their necessary connection. The opinion maintained by Marcus of Bamberg, that it depends on inflammation of the lymphatic system, is totally groundless; and that by Walch, that it consists in inflammation of the intestinal glands, and mixture of a poison with the chyle and blood, is a combination of assumption with probability.

Throwing aside speculation, if we search for matters of fact only which are palpable and admit of demonstration, we find,

first, that the blood in ague seems to differ in no respect from that in other healthy states of the body, further than in not being so thoroughly aërated, in consequence of the difficulty with which it moves through the capillary system of the pulmonary artery and veins. This depends on two circumstances. *1st*, The blood, as we shall presently show, moves more slowly than natural in the capillaries both of the general system and of the lungs. Considerable accumulation takes place; the wonted exhalation and secretions are suspended; and this accumulation is sufficient to cause much of the oppression, panting, and anxious breathing, so remarkable in the cold stage and beginning of the hot, *2d*, The energy of the muscular agents of respiration, as the intercostal muscles and diaphragm, is directly impaired with that of the muscular system generally; and hence the mechanical changes in the dimensions of the chest are less easily affected than in health.

Secondly, the blood in ague and fever generally moves more slowly than natural through the capillaries. I am aware that this may appear paradoxical to those who have been accustomed to hear and to speak of the *accelerated circulation, increased action, and increased impulse*, of blood in fevers. These expressions, however, I am prepared to show, are adopted from fallacious views of the circulation, derived from the increased number of times which the heart contracts in a given space, and, further, that the idea of increased velocity in the motion of the blood is altogether a gratuitous assumption. If the heart empties itself at each contraction in the healthy state, which, however, is very doubtful, it certainly does not, when it contracts with preternatural and morbid frequency. When the contractions are observed in the heart of a living animal, it is manifest that they are by no means so complete and efficient as to obliterate the cavities of the ventricles. Whenever, from any cause, these contractions become more frequent in a given time than natural, they are then still less complete and efficient, and seem quite inadequate to obliterate the cavities and empty the ventricles. From this, therefore, it follows, that a smaller quantity of blood is expelled from the ventricles at each preternaturally frequent contraction, than at each contraction of the normal frequency; and that much more blood passes through the heart when it contracts sixty times in the minute than when it contracts seventy times, and more when it contracts seventy

times than when it contracts 90 or 100 or 120 times. It must also follow, that the blood moves more slowly when the heart contracts with unnatural, than when it contracts with the normal frequency; that it moves most quickly when the ventricles contract slowly, uniformly, regularly, and steadily, so as to expel the blood with efficiency from their chambers; and most slowly when they are contracted suddenly, and without sufficient interval to recover themselves. Indeed, one of the chief causes of this sudden and rapid contraction after an unusually short interval, is the fact that the ventricle is never sufficiently emptied to remove the stimulus of its own blood, which, therefore, excites it to premature contraction. So far, therefore, as the frequent contractions of the heart in a given time go, they do not prove accelerated motion of the blood.

In the case of the blood-vessels, it is still more manifest that the blood in them does not during fever augment its velocity. From the first appearance of febrile symptoms, the energy and vigour of the capillaries and exhalants appears to be immediately destroyed. They become as if entirely torpid, inert, and paralyzed. Instead of retaining the same uniform diameter which is requisite for the effectual performance of nutrition and secretion, they become inordinately contracted at the invasion of the disease, and during the cold fit; whereas, in the hot fit, the capillaries become distended, but with a contracted state of the exhalants. These facts are abundantly proved by the circumstances of the vascular system observed in the hot fit, when it is common to see the temporal artery much dilated, the eyes red and ferrety, and the face injected and bloated, yet without a particle of moisture appearing on the head or face. The blood is then accumulated in the capillaries, but is not removed from them by the veins with the same facility as in health. This state, which is established in the first days of the febrile attack, continues during the subsequent days to augment, so that the over-distended capillaries are every hour of the disease rendered less capable of contracting on their contents, and promoting their transmission to the venous tubes. In this manner is induced a state which has been denominated *congestion*, in which the prominent characters are great oppression of all the organs, and which, if not spontaneously resolved or removed by art, infallibly proves adequate to extinguish life. This accumulation and congestion is not restricted to one or-

gan, or to one set of capillaries in fever, but extends, in a greater or less degree, to every part of the capillary system. It takes place in the capillaries of the brain, and the spinal chord, and their membranes, in those of the lungs, in those of the alimentary canal, of the liver and spleen, in those of the kidneys, and, in short, in every texture and organ; and hence the general derangement of functions all over the frame.

This general congestion of the capillary vessels constitutes that peculiar oppression over the whole frame, which has been generally, but erroneously, regarded as an affection of the nervous system exclusively. The weight and heaviness of the head, the oppressive languor of all the muscles, and particularly in the back, the inability to retain the body or limbs in the erect position, and the natural desire for the horizontal posture, which are its leading characters, depend, I conceive, entirely on the load of blood with which the capillaries of the whole body and all its organs are oppressed. This, indeed, cannot be directly demonstrated by anatomical inspection, because it almost never happens that individuals are cut off on the first day or days of fever; and, when the fatal event takes place, we recognize only the effects of the morbid action, and not the exact nature of the process itself. But it admits of as satisfactory evidence as any question of this kind, by comparing the appearances found in different patients cut off at different stages, and, throwing aside those phenomena which are manifestly to be regarded as mere effects, selecting those only which by their constancy appear to be entitled to the character of causes.

By this procedure we find that the most usual appearance in fevers is a preternatural accumulation of blood in the capillaries of all the organs, and most particularly in those which are naturally most copiously supplied with blood, for instance the brain and spinal chord, the lungs, the liver, the spleen, and the kidneys, and among the external organs, the muscles and the skin.

These, I conceive, are matters of fact which cannot be disputed. On their cause or causes, however, various opinions have been promulgated. The chief of these may be referred to two heads; 1st, that which ascribes this congestion to some state of the solids; and 2d, that which ascribes it to some change in the fluids.

It can scarcely be questioned that the vessels of the living body

undergo some deviation from the healthy state ; but what is the exact nature of this deviation is very much matter of conjecture. There is good reason to believe that the innate properties of these vessels, whatever they are, that is, their erethism or excitability, and their *tone* or *energy*, are more or less impaired or enfeebled, in some instances to a very great degree. Numerous facts recorded by Haller, Whytt, Spallanzani, Wilson Philip, Thomson, Hastings, and Marshall Hall show that in the state of health these vessels possess some living powers, though they are by no means very well defined ; and if, with the results of these experiments, we combine the facts ascertained by Dutrochet regarding the properties denominated *endosmose* and *exosmose*, we can imagine that these properties are in some degree, if not entirely, necessary to the perfect state of the capillary circulation and its dependent processes of nutrition and secretion. Farther, if we admit that these properties exist, we must also allow that, like all others, they are liable to be deranged, impaired, or even altogether destroyed, and, in consequence of this, that the vessels in which they reside are no longer adequate to carry on the motion of their contents.

That some change or disorder, some impairment of energy in the capillaries, does take place in fever, may be inferred, 1st, from the general phenomena of that disease, in which the circulating, nutritious, and secreting functions are very much disordered ; 2d, from the effects of that disease, in which we always recognize the chief lesions in the capillaries of the brain, lungs, muscles, &c. ; 3d, from our knowledge of the usual causes of fever, which in other instances operate chiefly on the vascular system ; and 4th, from our knowledge of the effects of remedial agents, which seem to be beneficial chiefly as they operate on the vascular system, or the secreting membranes or organs. Beyond this, however, I cannot attempt to proceed.

2. The blood itself may be changed in two ways. *First*, it may be increased or diminished in quantity ; and, *secondly*, its qualities are supposed to be susceptible of alteration.

a. It is impossible to suppose the blood either to be augmented or diminished in quantity in fever, because that could not take place by any intelligible means in a person who previously in health is all at once assailed with the symptoms of fever. It appears, indeed, to be increased in quantity. But if the circumstances supposed to indicate this increase be con-

sidered, they may be easily shown to arise from the capillaries having lost their powers of transmission, and thereby giving rise to accumulation. It seems, indeed, reasonable, according to hydraulic principles, to suppose that the suppression of the various secretions formed from the blood, which constitutes so conspicuous a part of most fevers, must augment the quantity of that fluid. But when it is remembered that the vessels must previously lose their natural erethism and tone, this temporary *plethora* must be admitted to be rather an effect than a cause. Thus it seems more rational to think that the circulation of the blood through the lungs is impeded and rendered difficult in fever by the vessels of those organs being in a state of temporary *anæsthesia* and *atony*, and perhaps by the bronchial membrane being less capable of allowing the blood contained in them to be freely aërated, than by supposing the blood to be actually increased in quantity. It must be remarked, nevertheless, that it comes to the same result; and though the blood is not absolutely increased in quantity, it is evidently too great for the impaired powers of the capillaries of the different organs. These vessels, though in the healthy state adequate to the transmission of the blood and the other changes, are, in the state of disease, no longer so, and hence give rise to symptoms of real plethora or accumulation.

b. The idea, that the blood undergoes in fever some change in its chemical qualities, has been more or less generally maintained at different periods of the history of medicine. Passing over the unintelligible ideas of the ancients, we find that in modern times, Francis De le Boé, commonly called *Sylvius*, considered the blood in malignant fever to be attenuated, to abound in volatile or alkaline salts, and to be deficient in vital air. Willis, on the contrary, maintained that the presence of saline matter in the blood restrained its fermentation in fevers, and that those in whom the blood was well saturated with volatilized salt, were less obnoxious to fevers. (*De Febris*, cap. i.) A little later, Ramazzini attributed the intermittent fevers prevalent in the Modenese territory in 1692, to coagulation of the blood by acids; but finding alkalis of no avail, he then inferred that it was dissolved by alkalis, and gave acids. At the close of the seventeenth, and beginning of the eighteenth century, it was very generally maintained that fevers consisted in fermentations resulting from the union of acid and alkaline sub-

stances in the blood. But about this time, Vieussens and Homberg, by proving experimentally the presence of free acid in blood, gave a sort of credit to the speculation, that acid is the predominant principle, and that its presence gave the blood consistence, or restored it if lost.

These fancies were entirely exploded by Hoffmann and Boerhaave; and the chemical qualities of the blood were for some years utterly overlooked, till the eclectic system of the latter directed to them some attention. This, however, was merely temporary; and the state of the blood was either neglected amidst the general attention which the study of the solids engrossed, or it was made the subject of vague and erroneous speculations. Of late, however, the progress and diffusion of accurate chemical knowledge has enabled physicians to consider this subject more attentively.

I shall have occasion to advert to the views of Dr Reid Clanny on the state of the blood in continued fever, when treating of that disease. At present, I have to notice that Dr Stevens infers that in ague the blood loses part of its saline impregnation for the following reasons. *1st*, Because, in the Tennessee country in North America, the salt-boilers of a salt-work village are not attacked with ague or remittent, while the inhabitants of the town during the hot months are exceedingly subject to violent and even fatal attacks; *2d*, Because persons attacked by the disease are, when fully exposed to the saline atmosphere of the works, more speedily cured than when treated by bark and other remedies; *3d*, The blood of an individual working in the swampy country was dark-coloured, and its serum was brown, and had an oily colour, while that of a salt-boiler was healthy or florid, and its serum was clear; *4th*, Because the water of the springs at this village communicates a bright red colour to the darkest venous blood; *5th*, Because the inhabitants of salt marshes are not liable to agues while the marshes continue saline, and those who live in marshy districts preserve themselves from ague by salt food and saline medicines.

The doctrine founded on these statements it would be idle to attempt to refute, until it is known whether the facts are really well established. Without denying positively the fact of the blood being changed in ague, I question entirely the influence of the agents to which the change is ascribed, and also

the fact of the absolute diminution of saline matter. It is certain that, on the coasts of the Mediterranean, in the south of France, at Aigues Mortes, Martigues, and many similar places where salt marshes are equally productive of agues as fresh water, the presence of the saline impregnation does not prevent the prevalence of the disease; and in some places of Britain, as in Norfolk, &c. the admixture of sea water with the marsh has appeared to induce agues, to the production of which the presence of the latter alone was inadequate.

From the previous good health of individuals attacked, on the contrary, from the suddenness of the attack after exposure to malaria, especially in the case of Europeans or sailors landing for a single night on a malarial coast, from the progressive changes, and from the characters of the blood drawn at different periods of ague, I infer that the changes, when recognized, depend on the diseased action of the fever itself, and especially on the remarkable lesion of the function of respiration. No one who ever witnessed a patient in the cold stage of ague, can believe that the embarrassed state of that function, and the overloaded condition of the pulmonary vessels, can continue long without effecting very great changes in the blood. If the function of respiration, that is, aëration, is requisite to the sound state of that fluid, then it follows, that after a few paroxysms, the blood must be very much altered. On this change we have few specific facts. But I infer that, as it circulates more slowly than natural, and perhaps stagnates altogether, it does not part with so much of its carbon, nor receive so much oxygen in a given time, as it does naturally, neither does it exhale so freely its watery vapour. It is also to be remembered, that, in consequence of the interruption of the digestive and chylopoietic function, the materials of the blood are not renewed, and consequently the process of sanguification must be suspended, if not subverted. These circumstances are surely sufficient to account for the changes taking place in the blood in the course of fever, without supposing that the constitution of that fluid is all at once changed at the commencement, as the hypothesis of Dr Stevens implies.

It is, however, not impossible that some peculiar insalubrious principle,—probably that which constitutes *malaria*, may be inhaled during respiration, and so mingling with the blood may render it less fit for healthy circulation than before. This,

however, though it might alter the constitution of the blood, may not diminish the saline impregnation; and there is reason to believe that if it operates directly on the circulating fluid, it may impair the fluidity of its serum, and diminish the tenacity of the clot. I avoid, however, any speculation or conjecture.

The application of the foregoing considerations to ague is attended with some difficulty; and one of the most prominent of these, is the circumstance of the intermission, and the periodical recurrence of the symptoms. By what means any morbid state either of the nervous or of the sanguiferous system, or of both, should continue a certain time, then cease, and return at a definite period, are circumstances which have always attracted the attention and exercised the ingenuity of physicians. In their explanations, however, they have not been fortunate. Willis tells us at once that the fever intermits because all the morbid matter is expelled by a single paroxysm, and that until new morbid matter is substituted, *apirexia* necessarily follows. (De Febribus, chap. iii). But if this were the fact, then every ague ought to terminate in a single paroxysm. Cullen ascribed the alternations of ague to the general tendency of the animal or human economy, to diurnal revolution. (First Lines, 55, 56, chap. iii. 109, chap. v).

The ideas of Darwin, who also attempted to solve this difficulty, are not very intelligible; but so far as I understand them, they seem to be the following. When, from any cause, the sensorial or nervous influence over the system is diminished, the motions of the vascular and other dependent systems are also impaired and enfeebled. During the state of quiescence or inactivity thus induced, however, sensorial power is accumulated, and, as it was saved before, it now becomes excessive; and this takes place, he argues, soonest in the capillaries of the skin, which are most remote from the influence of the sensorial or nervous energy. The excessive development of sensorial power then taking place is displayed, he tells us, in the increased action of the hot fit; "which two states of the system reciprocally induce each other by a kind of libration, (*oscillation*, he seems to mean), or a *plus* and *minus* of the sensorial powers of irritation and association." He further imagines that the cold fit produces a congestion of vessels in some of the organs, from which their vessels do not entirely recover in the hot fit, and hence that every preceding cold fit must lay the foundation for a

subsequent one.* These views contain several assumptions, and in other respects cannot be regarded as doing more than merely stating the occurrence of the hot and cold fits in different terms from those in which they are usually described.

The ideas of the next person by whom the explanation of this subject was attempted, if more intelligible, are not more susceptible of demonstration. Hildenbrand, to whom I allude, has recourse, with the view of explaining the periodical character of agues, to the periodical revolutions exhibited by cosmic phenomena, or the revolutions of the earth and moon, in other words, to sol-lunar influence. With this he remarks the periodical regularity observed by many of the phenomena of organized bodies, for instance, the alternate succession of sleep and watching, the periodical recurrence of the menstrual discharge, &c. Quotidian paroxysms, whether of intermittents or remittents, he represents to be under the influence of the daily rotation of the earth on her axis; those of the tertian, observing the first, third, fifth, and seventh days, and the quartan, observing the first, fourth, and seventh, appear to correspond to lunar periods; while the duplicated and tripled tertians depend on the combination of lunar and telluric influence.† In favour of these views, it may be stated, that aguish attacks are more frequent, and aguish paroxysms more severe, at the period of new and full moon, were it not to be remembered that the high tides at these periods may, by flooding various parts of the coast, and rains also, by operating on the terrestrial surface, be quite as likely to induce ague as the direct and reciprocal influence of the earth and moon, or the sun, moon, and earth.

The most recent speculator on this subject has advanced another explanation, which, when minutely examined, is virtually the same with that of Cullen. M. Bailly,‡ who has studied attentively the phenomena of agues in Rome, maintains that their revolutions are merely the exaggerated forms of certain natural motions observed in all cases, more or less regularly, in the human body. Each space of twenty-four hours (*nycthemeron*) in the human frame consists of a continued succession of excitations, or rather congestions, of the vascular

* Zoonomia, 3d edit. vol. iv. Supplement. Theory of Fever, vii. and viii. London, 1801.

† Valentini Nobilis ab Hildenbrand. Institutiones Medico-Practicae, Tom. ii.

‡ Traité Anatomico-Pathologique des Fievres Intermittentes Simples et Pernicieuses. Par E. M. Bailly. Paris, 1825.

system, which are manifested in the erect position in the alimentary canal, and in the horizontal in the brain, and which in delicate, nervous, or susceptible persons, are much more strongly marked than in the robust and vigorous. These are chiefly the effect of physical or mere hydraulic laws, and show the influence of gravitation and other causes over physiological or vital agents, or, at least, the morbid reaction of the two. In persons of the description now mentioned, there is an evening exacerbation and a morning remission, indicated in the former case by heat and dryness of the skin, and in the latter by warm moisture and coolness of the surface, with softened pulse. The application of this speculation to the several varieties of ague M. Bailly does not attempt; and it may be doubted after all, whether any further explanation can be offered than the mere fact, that such is the arrangement of the phenomena.

§. IV. TREATMENT.

In directing the treatment of agues, physicians have established different indications of cure, according to the opinions which they entertained of the cause of the morbid action. James de le Boe, for instance, proposed, by his remedies, to counteract coagulation and inspissation of the blood; while Stahl, who ascribed agues to the salutary efforts of nature, proposed to favour these intentions by blood-letting and other evacuations, and was averse to the use of bark, which he charged with producing dropsy and consumption. Hoffmann impressed the necessity of relaxing spasm and restoring tone by means of bark. Sydenham, who imagined that ague consisted in some evolution or fermentation of the blood tending to its despumation, thought it important to regulate this fermentation and despumation, to expel morbid matter, and restore tone. Morton proposed to regulate the motions of morbid matter, to keep the spirits in order, and to restore tone; and the chief object of Boerhaave was to remove morbid viscosity or lentor of the blood.

The absurdity of these fancies arose from erroneous pathology; and Cullen certainly rendered a great service when he referred his measures to the following general indications;—
1. in the time of intermission to prevent the return of the paroxysms; 2. in the time of paroxysms to conduct them in such a manner as to effect a final solution of the disease; and 3. to counteract the operation of those circumstances which

might interfere with either of the two first objects. A doctrine certainly less clear, though perhaps in some respects not less true, was taught by Darwin, who impressed the necessity of breaking the circle of associated, and the train of concatenated motions.

Others have proposed to cure agues by acting directly on the poison supposed to be present in the system; and have studied to explain the action of successful remedies by assuming their power of counteracting that of the febrific cause or causes. Hence the number of febrifuge remedies which have been in use at different times.

It must nevertheless be admitted, that theory has done little or nothing for the successful treatment of intermittent fever, and that our knowledge and employment of the most efficacious remedies have been derived almost solely from experience. It is therefore unnecessary to form intentions of cure, as they are named; and, while the treatment of intermittents must be regulated very much by the symptoms, as they occur in the different varieties and stages of the disease, we must abandon the idea of employing any remedial measures as direct antifebrile agents. I shall merely, therefore, attempt to arrange the remedial measures found useful in agues, according to the circumstances under which they have been found most beneficial. In this we are guided by certain facts, which it is useful to render available in the administration of remedies.

From the history of agues already delivered, I conceive three points may be allowed to be safely established. *1st*, That some agues, under certain circumstances, admit of spontaneous cure; *2dly*, that, if paroxysms are prevented from recurring, the disease is more likely to disappear than if they are allowed to recur; and *3dly*, that, if permanent congestion or inflammation of organs is prevented from taking place, the disease is much more curable than if it does. For these reasons, I think the treatment of ague ought to embrace three objects. In the *first* place, to conduct the paroxysms in such a manner, as to moderate their violence, abridge their duration, and prevent their recurrence; in the *second* place, to employ, during the period of intermission, those remedies which are known to diminish the tendency to return; and *thirdly*, to counteract, by suitable means, congestion, inflammation, or organic changes.

I. With the view of moderating the violence, and abridging

the duration of paroxysms, it is necessary to alleviate the urgent symptoms of the cold and hot fits.

At the approach of the cold fit it is important to apply by all means external heat. The peasants in the Roman territory, the inhabitants of Jamaica, and the Ethiopians, are said to be in the habit of exposing themselves to the solar rays. The warmth of a fire, bed-clothes, or even the warm bath, may be employed in cold or temperate climates. In general, a bladder of hot water applied to the pit of the stomach, hot bottles, bags of hot salt, hot bran, or hot sand, to the extremities, with the liberal use of warm diluent liquors, are the means of abating the chill of the aguish rigor. An opiate, also, consisting of from thirty to fifty minims of laudanum, sedative liquor, or solution of muriate of morphia, is of great use in abating the violence of the shaking and trembling, and abridging the duration of the cold fit generally; and if to this be added a drachm of antimonial wine, it will operate afterwards powerfully as a sudorific. In children, Lind found that rubbing the spine with a liniment of equal parts of laudanum and soap liniment at the approach of the cold stage often prevented the paroxysm.

The practice of giving opiates before the approach of the cold fit, has been followed by many physicians with good effect; and we find that La Riviere, Heurnius, Frederic Hoffmann, and Tralles, were in the habit of administering some preparation of opium an hour or two before the expected accession, with the effect, it is said, of rendering the symptoms milder and shorter in duration, and, after one or two repetitions, of curing the ague. This is perhaps exaggeration; but we know that Dr Trotter found opium or laudanum, in doses of from thirty to sixty drops, given at the approach of the cold fit, was completely efficacious in preventing it and its subsequent recurrence; and that Mr Maclesh, an army surgeon, was in the habit of giving three grains of the drug three hours before the expected accession, and repeating it until the quantity sometimes amounted to twelve grains, in the obstinate agues of Corsica with the greatest benefit. (Blane.)

The approach of the cold fit is generally attended with a feeling of squeamishness and weight at the pit of the stomach; and if at this time an emetic be exhibited, and full vomiting be favoured by warm liquors, the uneasy sensations are much alleviated. For this purpose, twenty, twenty-five, or thirty grains of ipecacuan, with half a grain or one grain of tartrate of anti-

mony, may be given at the first feelings of languor; and the patient should drink copiously afterwards warm infusion of chamomile (*Anthemis nobilis*), or orange flowers or leaves, or penny royal (*Mentha pulegium*), elder flower, or lime-tree flower water, or balm tea (*Melissa officinalis*). A convenient and effectual emetic is the infusion of ipecacuan, formed by half a drachm of the powder, or two drachms of the root, in a tea-cupful (five or six ounces) of boiling water. This given at the first symptoms of the cold fit in the ague of the West Indies, we are informed by Dr Clark, not only cleansed the stomach and shortened the paroxysm, but in some instances entirely removed the disease.

The use of drink, however, in the cold fit, is prohibited by Cleghorn, on the idea, that, because the *vena cava* and subclavian vein are overloaded with blood, the thoracic duct must be compressed, and, consequently, the fluid conveyed into the stomach is not absorbed, but distends the whole alimentary canal. On this account, he recommends that the patient should rinse his mouth only, or use slices of lemon, or small quantities of similar acids. The reasons assigned by Cleghorn for this practice are probably entirely hypothetical; and, at all events, while it is necessary to quench thirst by warm liquors, to employ them with the view of unloading the stomach by vomiting, annihilates his objection entirely.

Many years ago Dr Kellie of Leith found the application of a tourniquet or compressive ligature, on one of the large arteries of the extremities, very effectual in checking the progress of the cold fit, if applied before, or at its onset; and, though such a remedy cannot be expected to be effectual in all cases, it is certainly proper to employ it.

Some physicians, such as Hildenbrand, disapprove of cold liquids, as dangerous and injurious. But the Spanish physicians have for a long period allowed cold water from the cistern, and apparently without bad effects. It may be observed, nevertheless, that a large quantity of cold fluid is much more likely to overload and distend the stomach than hot, which facilitates vomiting, and quenches thirst at the same time.

If cold fluids are used at all, the best is the effervescing draught, soda water, brisk beer, or mouthfuls of the saline mixtures, or any of the ptisans, with nitre dissolved in them.

The use of animal jelly is recommended in the cold stage

by Hallé as useful in diminishing the sense of burning at the pit of the stomach, and abating the oppression and anxiety. (*Journ. Gen. de. Med.* ix. p. 336).

Blood-letting is in general in open agues without local determination or inflammation in the cold stage unnecessary. The question regarding its utility at the commencement of the paroxysm of ague has received at various times different degrees of attention. Though disapproved of as injurious more or less decidedly by Morton, Senac, Coliny, and Pringle, it has, nevertheless, been practised or recommended as occasionally useful by various physicians. La Riviere mentions the case of a woman in the seventh month of pregnancy, who had been attacked with a double tertian which had resisted for an entire month three venesections, two purgative doses, and numerous aperient and refrigerant juleps. At length, by venesection performed about one hour before the accession, preceded by a julep of decoction of chamomile and cream of tartar, the accession never took place, and the ague was entirely removed. La Riviere further mentions an empiric who cured many persons affected by tertians, by the exhibition of a single purge, and afterwards by opening a vein at the very commencement of the fit, which is said to have had the effect of moderating the accession and abridging its duration, and afterwards preventing its recurrence.

Upon the faith of these testimonies apparently, Priens and Rayger recommended venesection as best at the commencement of the paroxysm; and the latter assures us, that he found it successful not only in quartans but in tertians; and in another passage he adds, that he had often practised blood-letting at the very hour, nay, at the very beginning, of the paroxysm, with the best effect.* Rommel, however, after mentioning a case of tertian ague entirely removed by scarification during the fit, adds, that in the tertians which were very prevalent in 1685-6, many persons, by whose persuasion he could not tell, performed blood-letting at the approach of the paroxysm, but all without benefit, and with greater loss of health and strength. (*Ephemer. Nat. Cur.* Dec. ii. Ann. 6, Obs. 228).

Notwithstanding the variable results thus obtained, blood-letting at the approach of the paroxysm was tried by Jackson

* “*Ego sæpius venæsectionem adhibui ipsa hora, immo sub initium paroxysmi maximo cum effectu.*” *Ad Rulandi Thes. Med. in Notis.*

and others of the army physicians, sometimes with apparent benefit, often without any; and it has been in general withheld, unless in cases in which oppression of some vital organ, as the brain or lungs, urgently required its employment.

Still more recently it has been recommended and practised by Dr Mackintosh of Edinburgh with the apparent effect of shortening and mitigating the cold stage, ameliorating the hot and sweating one, and in some instances annihilating them entirely, and thus putting a stop to the course of the disease. The amount drawn does not require always to be large. Though in two cases twenty ounces were drawn, in the majority ten, twelve, or fourteen only were abstracted. (Edin. Med. and Surg. Journ. xxvii. p. 260, and xxviii. p. 278).

This mode of treatment has been also tried by Drs Stokes, Townsend, and Law of Dublin, Dr Kelly of Castlerea, Mr Gill of Lincolnshire, and Mr Twining and others in the East Indies, and with very opposite results. Drs Townsend and Law found it to fail in the majority of cases. Dr Stokes found that the most usual effect of blood-letting in the cold stage was to check the *rigor* or shivering fit, and next to this, to mitigate its severity without abridging its duration, which it seems very rarely to have done. In the majority of cases in the practice of Dr Stokes, no effect was produced in the hot and sweating stages, and in very few were these stages rendered milder. In the practice of Dr Kelly, its general effect was to shorten the cold stage, and to render the hot one milder; but in some cases it aggravated the symptoms. In the practice of Mr Gill, though it had the effect of cutting short the cold stage, it appeared to lengthen the febrile stage generally. (Edin. Med. and Surg. Journal, xxxi. p. 31.)

In the numerous trials, again, of this practice made in India, by Mr Twining, Dr Mackenzie, Mr Dempster, and Mr Griffiths, very opposite results were obtained. From these trials it appears in general that the practice, besides being void of danger, is, if employed at the commencement of the rigors, effectual in abridging the duration and mitigating the severity of the cold stage; that it mitigates the severity of the hot and sweating stages; that, instead of superseding the use of purgatives and other remedies, it is most effectual when aided by them; and that in several instances it stops the subsequent

course of the disease. (Trans. Med. and Phys. Society of Calcutta, v.)

These results are in general still incapable of being reconciled; and we have certainly yet something to learn regarding the employment of blood-letting in the cold stage of ague. I believe that the safest course in the present state of the question is, in ordinary open and incipient agues, to avoid blood-letting in the cold stage, and to have recourse to this evacuation only when it is distinctly indicated by violent local determination or inflammation, or by such symptoms as evince the congestive oppression of a vital organ. It is more requisite in autumnal than in vernal agues, and more in certain epidemic constitutions than in others.

As the shivering and sense of cold abate, and are followed by heat, it is proper to remove the hot applications,—to diminish the quantity of bed-clothes and other coverings,—to lower the temperature of the chamber,—and to administer cold fluids internally, of which the acidulous mineral or vegetable drinks are in general the most proper. Lemonade, apple-tea, or water acidulated with the juice of the barberry, the bilberry, the cranberry, or the supertartrate of potass, sulphuric or nitric acid, are in general the most grateful. But of each and all of these the patients tire; and it is requisite, as they get sick of one, to have recourse to another. Simple cold water, or iced water, is often extremely grateful, and is never injurious; and brisk beer, ginger beer, spruce beer, or soda water, may be safely taken at this time.

The surface at the same time should be kept cool; and the affusion of cold water even was proposed by Currie and Gianini for the purpose of allaying morbid heat. In the hot stage of ague, however, this is less admissible than during the intermissions; because it is liable to induce symptoms of local determination, or to aggravate them when present. It is, nevertheless, perfectly safe, and very useful, to sponge the surface of the body freely with tepid water.

If, during this stage, or at its transition into the sweating one, violent cough, with pain or constriction of the chest, should take place, or extreme headach with much delirium, or even insensibility, it will be necessary to detract fifteen, eighteen, or twenty ounces of blood, according to the strength of the patient and its effects, or to shave the scalp, and apply

twelve or eighteen leeches. It must be remembered, however, that this practice should be employed early, in order to be efficient; and that, if employed to the extent now mentioned, or repeatedly, when the disease is of some duration, it is much more likely to impair the patient's strength. If, on the contrary, blood-letting be employed early in the disease, we have the testimony of Botallus, Senac, (*De recondita Natura*, lib. ii. chap. iii.) Cleghorn, (*Diseases of Minorca*, chap. iii.) and Donald Monro, (*Diseases of Milit. Hospitals*, p. 148), to prove, that it occasionally cuts short the disease,—that it always moderates the severity of its symptoms,—and that it paves the way for the efficient employment of other remedies. This evacuation Cleghorn was in the habit of prescribing at the beginning of the hot fit, with great relief to all the symptoms; and it appears from every thing learnt by experience on this subject, that the nearer this time it is employed, the more likely is it to be beneficial.

To blisters or sinapisms the same objections do not apply; and these remedies may be applied with great safety in the hot fit, in order to produce derivation or counter-irritation when there are symptoms of oppression of the brain or lungs.

Of the utility of opium in the cold fit as a means of alleviating the convulsive shaking, abridging the duration of the paroxysm, and ameliorating the hot and sweating fits, I have already spoken. In the hot stage of the paroxysm it is not less useful. Though this substance has been administered in various modes, and in combination with various remedies, by a great number of practitioners in the general treatment of ague, it is entirely to Dr Lind of Haslar Hospital that we are indebted for the knowledge of its employment in the hot stage with a specific object. After observing the beneficial effect of an opiate in one case with great heat, he prescribed an opiate in twenty-three cases, *after* the hot fit,—if there was uneasiness, headach, or any similar symptom consequent on the fever. The result was, that of twenty-two who took the opiate, nineteen received immediate relief. He then ordered the opiate to be given *during* the hot fit; and in eleven of twelve cases to whom it was given, it removed headach, abated fever, and produced profuse sweating, followed by perfect intermission. From subsequent trials of this mode of giving opiates in the hot fit he draws the following inferences. 1st, It shortens and mitigates

the violence of the fit with great certainty; 2d, it generally gives sensible relief to the head, diminishes the burning heat of the fever, and occasions profuse sweating with agreeable softness of the skin; and 3dly, it induces refreshing sleep, with general extinction of painful and uneasy feelings. By these means he conceives the administration of opiates proved remedial, and prevented the febrile process from injuring important organs; and, as a proof of this, he adds that dropsy or jaundice seldom attacked patients to whom opium had been administered in this manner. In short, while opium in no case aggravated the symptoms, it produced benefit in the majority. The only contraindication is delirium, which, however, it did not aggravate, but, for the subsidence of which it was requisite to wait, when the opiate was useful in relieving the consequent weakness and faintness. *Lastly*, Dr Lind maintains that opium exhibited in this manner is an excellent preparative for the efficient use of bark.

Cullen, without disapproving directly of this practice, expressed his doubts of its propriety. But Odier of Geneva found, that, by giving twenty-five drops of laudanum after the beginning of the hot stage, the symptoms were mitigated, and their duration abridged, and in some instances the disease was entirely cured; and Dr Clark of Dominica found that thirty or forty drops given to an adult in the hot fit was effectual in quickly producing sweating, shortening the fit, and tranquillizing the stomach. For children two or three tea-spoonfuls of syrup of poppies answer the same purpose, so as to enable the stomach to retain the bark. *

Such are the facts derived from experience alone. More extended observation, however, and correct knowledge of the effects of this substance on the circulation of the brain and the general secretions, have shown that these rules require some qualification. In the *first* place, I conceive it clearly results from the experience of most observers that the proper time for the employment of opium is the beginning of the cold fit, and hence, if administered then, it is unnecessary to give it in the hot one. In the *second* place, in simple open agues it is unnecessary in the hot fit; and in several of the complicated agues, as those with cerebro-meningeal or pneumo-bronchial congestion

* A Treatise on the Yellow Fever, &c. By James Clark, M. D. &c. Lond. 1797, p. 94.

or inflammation it is improper unless preceded by blood-letting. In the *third* place, I think that after a free bleeding at any time of the disease, opium is indicated in order to co-operate with the depletion in restoring the natural state of the circulation. To its use in complicated agues I shall afterwards advert.

In the sweating stage all that is requisite is to prevent the patient from exposing himself to cold, and suddenly checking the discharge. After it is concluded it is of great moment to change the patient's linen or clothing, and cleanse the surface thoroughly.

The treatment of the paroxysm of intermittents if complicated, disguised, or of a pernicious character, requires some modification, according to the symptoms of the disease which the ague assumes.

If the paroxysm presents symptoms either of congestion or inflammation of the brain or its membranes, of the thoracic or abdominal viscera, blood-letting, general and local, must be employed according to the urgency of the symptoms, the strength of the patient, and their effects as remedies.

In the first case, when the paroxysm is attended with violent delirium or coma, the effects of the depletion must be aided by shaving the head and the application of cold, while stimulating purgative *enemata* should be injected into the intestines, and sinapisms should be applied to the extremities for half an hour at a time. The same measures may be safely employed in the convulsive and tetanic tertians of hot seasons and warm climates.

When the paroxysm is attended with pain, weight or tightness in the chest, urgent cough, difficult breathing or pungent pain of the side, twelve, fifteen, twenty or twenty-five ounces of blood, according to circumstances, should be drawn from the arm suddenly; and if this evacuation is followed by the exhibition of two grains of opium or forty drops of laudanum, sedative liquor, or solution of muriate of morphia, in all probability these symptoms will speedily subside.

In the case of gastric or gastro-enteric symptoms with distension or fulness of the epigastric or umbilical regions, a blood-letting should be performed to the same extent; or, if the circumstances of the case are conceived to contraindicate this, eighteen or twenty leeches should be applied to the epigastric region; and the bowels should be freely opened by means of

castor oil, sulphate of magnesia, or the laxative electuary. If vomiting is frequent and urgent, after large draughts of tepid water, the effervescing mixture, with the blue pill, will be the most efficacious remedy; and if these fail, charcoal ought to be exhibited without delay.

When the paroxysms are attended with much squeamishness, sickness, vomiting, cardialgic, or colic pains, or with frequent bilious discharges from the stomach and bowels after the use of diluents, one, two, or three grains of opium, either alone or combined with aromatics, or forty or fifty drops of laudanum, or the solution of muriate of morphia, are the most beneficial remedies.

In aguish paroxysms assuming, or complicated with, dysenteric symptoms, as griping, tenesmus, bloody or slimy stools; if these symptoms do not yield to opiates alternated with purgatives, as castor oil and emollient *enemata*, the proper course will be to detract twelve or fifteen ounces of blood, or to apply eighteen leeches to the umbilical region or even the anus, and to give afterwards an antimonial opiate, or a scruple of Dover's powder, consisting of one grain of opium and three of ipecacuan. In this form of the disease also, a good remedy is the infusion of ipecacuan already mentioned. If the symptoms continue obstinate, the warm bath sometimes affords relief. But the most effectual remedy in this and all agues with gastro-enteric disorder, is charcoal to the amount of ten grains, or a scruple given five or six times daily if the stomach will bear it.

In agues with choleric symptoms, the first remedy, if the patient's strength permits, is blood-letting, followed by opium, either alone or conjoined with calomel. In the state of collapse, however, opiates and external heat alone are safest.

It is unnecessary to enter into the therapeutic details in the other forms of complicated ague; and it is sufficient to say, that the general rule is to employ those remedies which are demanded by the particular symptoms indicating, or believed to indicate, the presence of a particular disease. The great object which the practitioner should keep in view, is to prevent the febrile action during the paroxysm, whether that of irritation, inflammation, or congestion, from becoming fixed in any organ, or producing organic derangement, or laying the foundation of organic disease.

2. The second object in the treatment of ague, is to employ during the period of intermission those remedies which are known to diminish the tendency to return.

This has been attempted by various means, and with different degrees of success. The most usual are emetics, purgatives, blood-letting, tonics, and astringents and narcotics.

It has been observed in the management of agues, that an emetic given merely with the view of exciting vomiting in the interval, or two or three hours before the accession of the paroxysm, has prevented its approach, and in some instances completely cured the disease. In theory, Senac maintained the necessity of vomiting, because, he argued, the hepatic vessels and the *vena portæ* are much overloaded with slowly circulating blood, and nothing relieves this so certainly as full vomiting. In practice, also, he found it advantageous, and, indeed, its efficacy has been experimentally proved by many; for instance, Pringle, Monro, Brocklesby, and Jackson. Pringle states, however, that ipecacuan alone was not adequate to the removal of the marsh fever of the low countries, and that it was requisite to combine with twenty grains of ipecacuan two grains of emetic tartar. It is probable that in neither case will the remedy be always adequate to remove an ague; for we are informed by Jackson, that though emetics, to which he was obliged to have recourse for want of bark, were extremely useful in the ague of North America, he saw no instance in which they absolutely cut short the disease. The proper time is from one to four hours before the expected return of the paroxysm. Cleghorn was averse to their use as too violent, and Davis, one of the most recent authorities, had no fair opportunity of trying them.

Another mode of administering emetics is by giving nauseating doses; and Cullen mentions, that he knew a physician who cured agues by giving, an hour before the accession of the paroxysm, five grains of ipecacuan, or as much as would occasion great nausea and sickness without vomiting. (*Mat. Med.* ii. p. 478). One-fourth, or half a grain, of tartar emetic, may be given in the same manner.

Cathartics have also been employed in the intermission of agues; but there is no reason to believe that they have ever had the effect of cutting short the disease. There are, perhaps, few cases in which they can be safely omitted, since they

tend to prevent the accumulation of feculent matter and morbid secretions, and are useful in preventing congestion in the gastro-enteric, hepatic, and splenic circulation. Sydenham appears to have been indifferent to their employment during the treatment of ague, but to have been very desirous to impress the necessity of their administration after it was cured, in order to prevent enlarged liver or spleen, dropsy, consumption, and even rickets in children. Cleghorn recommended mild laxatives, as manna, cream of tartar, senna, and especially sulphate of magnesia. The great object is, to exhibit such remedies as, by acting regularly but gently, prevent accumulation and vascular congestion. With this view, six or eight grains of calomel, and ten or twelve grains of rhubarb, or the former with a few grains of extract of colocynth, may be given on the days on which there is no paroxysm. It is unnecessary, and perhaps injurious, to produce catharsis; and the drastics are therefore to be avoided. The compound powder of jalap may be given with great advantage.

Of blood-letting in the cold and hot stages as a means of mitigating the violence of the symptoms, I have already spoken. It is sometimes not less useful in the intermission, as a remedy which immediately almost puts a stop to the morbid process. It is indicated, *first*, in young, robust, plethoric subjects; *2d*, in cases in which hemorrhages have been suppressed during the ague, as suppression of the menstrual discharge in females, or the hemorrhoidal in males; *3d*, in those cases in which the febrile process has induced more or less congestion or inflammation, subacute or chronic, in the abdominal viscera; *4th*, in those cases of ague in which the process has induced actual symptoms of acute inflammation, as in the varieties already alluded to; *5th*, when the intermission is short, imperfect, or indistinct; and, *6th*, in certain epidemic constitutions, in which ague assumes a very decided character of local congestion or inflammation, and in which all remedies are unavailing until these are subdued by suitable depletion.

These different circumstances may take place in any form of ague. But while the tertian presents most frequently affections of the cerebro-meningeal, and of the pneumo-bronchial vessels, the quartan is most generally marked by disorder in those of the alimentary canal, liver, and spleen. Hence blood-letting

requires to be repeated often in the latter before a cure is effected.

In a great majority of instances, however, paroxysms of agues have been found to be most certainly prevented from returning by the exhibition of various substances, vegetable or mineral, possessing, indeed, properties of very opposite qualities, and which it is therefore impossible to refer to general heads. The most effectual possess in general tonic or astringent properties, or both, or at least properties which excite the capillaries to healthy action. Among the former may be classed the various species of Peruvian bark; a number of vegetable bitters, as the Caribbean bark, Angustura bark, lily-tree bark, root of dandelion, succory, gentian, columbo, chamomile, herb of trefoil, less centaury, blessed thistle, quassia; vegetable astringents, as the bark of different species of willow, horse-chestnut, ash, beech, alder, pear-tree, service-tree, horn-bean, logwood, pomegranate-tree, oak, tormentil, and galls; aromatic bitters, as cascarilla, snake-root, sweet flag, pellitory, black pepper, garlic; the narcotic acrids, as *nux vomica*, St Ignatius bean, wolf's-bane, leopard's-bane, and bitter-sweet. Among the latter are classed such neutral salts as subcarbonate of potass, ammonia, or carbonate of ammonia, sal-ammoniac, alum, salts of iron, of mercury, of zinc, and of arsenic.

Of all these substances, the most celebrated, and certainly the most uniformly successful, is the Peruvian bark. This substance is the bark of a tree of the natural order *Rubiaceæ*, growing in the mountainous parts of Peru, near Loxa, and in the province of Quito, at an elevation of not less than 975 toises, or 6230 feet above the level of the sea. The febrifuge powers of the bark of these trees appear to have been early known in the town of Loxa; but in consequence of curing an obstinate ague in 1638, in the lady of Count Cinchon, a Spanish peer, who was viceroy of Lima between 1629 and 1639, its efficacy became celebrated in Europe; and Linnæus perpetuated the name of the family by applying to the genus the appellation of *Cinchona*.

Of this tree, no fewer than twenty-seven species have been distinguished by botanists; but the Peruvian bark of commerce is supposed to be obtained from one or other of the following species, *Cinchona Condaminea*, *C. lancifolia*, *nitida* and *lan- ceolata*, *C. cordifolia*, *oblongifolia*, *ovalifolia*, *Brasiliensis*, ex-

celsa, and *pubescens*. Though not more than three species of bark are in general met with in Britain, the different sorts imported into Europe have been distinguished by Von Bergen into eight, in the following manner.

1. Red bark, (*China rubra*) said to be obtained from the bark of the *Cinchona oblongifolia*, but according to Von Bergen from a species not yet determined. This, which is the common red bark of commerce, though intensely bitter and astringent, and capable of curing ague, is not allowed by Mutis to be directly febrifuge. 2. *China Loxa*, Crown bark, derived from the *Cinchona Condaminea* of Humboldt and Bonpland, the same tree to which Linnæus applies the vague name of officinal. This, which occurs always in quills, has been in use only since 1804, and is destined for the use of the Spanish court, so that when found in this country it must have been clandestinely imported. By the natives it is distinguished by the name of *Cascarilla fina*, and *Quina de Loxa*. Though, according to Mutis, not directly febrifuge, it is an excellent remedy. 3. Silver, Guanaco or Huanaco bark, *Quina huanaco vel guanaco*, ascribed by Hayne to the *Cinchona cordifolia*, by Virey to the *C. glandulifera*, but not ascertained, according to Von Bergen, occurs in quills, exactly similar in smell, taste, and fracture to the last, is also, though according to Mutis not directly febrifuge, a good remedy. 4. Yellow, or Royal bark, *Quina regia*, ascribed to the *C. lancifolia*, but according to Von Bergen not yet accurately determined, with a more bitter astringent and stronger taste, but weaker smell, containing less resin than the red bark, and less gum than the pale, and quinine alone, is represented by Mutis to be directly febrifuge, and to be much more efficacious in curing ague than either of the two others. At Loxa, we are informed by Humboldt, it is that which is most esteemed, and passes under the name of *Cascarilla fina*. 5. Hard Carthagenia or Santa Fé bark, in quills and flat pieces produced by the *C. cordifolia*; and, 6. Yellow fibrous, or woody Carthagenia bark, said by Mutis to be obtained from the *Cinchona lancifolia*, but according to Von Bergen not ascertained. Both kinds are said to be confounded under the general name of orange-bark; *Cortex aurantiacus*, *China aurantiaca*, *China Bogotensis*, *China de Santa Fé*, *China Narangeada*. The bark obtained from the *C. lancifolia* is at all events represented by M. Mutis to be particularly and power-

fully febrifuge. 7. Rusty bark, *China huamalies*, *China fusca*, source undetermined. 8. Ash bark, *China Jaen*, obtained from the *C. ovata*, or *pubescens* of Vahl; and, 9. False Crown bark, *China pseudo-Loxa*, from the *C. lancifolia*,—often sold as real Crown bark, which it closely resembles.

Of all these varieties of bark, the fourth and the sixth only are allowed by Mutis to be directly febrifuge, and best adapted for the cure of ague, though the first, and perhaps most of them, are capable of curing the disease. For this purpose, again, Humboldt represents the barks of the *C. Condaminea* and the *C. lancifolia* to be preferable; but perhaps even in his time the generic characters of the different sources of the best varieties of bark were not infallibly determined. This point, it would be of some importance to determine; for one or two drachms of the best febrifuge bark would be more effectual in removing ague than two ounces of the other varieties. Mutis and Zea indeed state that two drachms of genuine yellow bark are sufficient to prevent the accession of an intermittent paroxysm, and to cure the disease.

Some of this difficulty, however, has been obviated by the recent discoveries of vegetable chemistry, which have extracted from the different sorts of bark the chemical principles on which their activity and energy as febrifuge agents depend. From the pale bark, treated according to a suitable process, MM. Pelletier and Caventou obtained an alkaloid principle possessing in an eminent degree the properties of the bark, and which they named, therefore, *cinchonina* or *cinchonia*, and which they found was combined in the bark with an acid which they denominated the *kinic*. From the yellow bark, treated according to the same process, they obtained a similar alkaloid principle, which they named *quinina* or *quinia*, and which they also found exists in the bark combined with the kinic acid. Lastly, they found both *cinchonine* and *quinine* existing in combination with excess of *kinic* acid in the red bark, from which they may be obtained by analytic decomposition. From the proportion and uniformity in which these principles were found in the different species of genuine Peruvian bark, and from their chemical properties, MM. Pelletier and Caventou inferred that cinchonine and quinine possess all the virtues of that substance, are the true febrifuge agents, and that their febrifuge virtues are somewhat augmented by the union of the kinic acid. Cinchonine and

quinine, however, are extremely insoluble, and therefore act with difficulty on the economy; and the combination with an acid is the best mode of promoting their operation.

These inferences were first confirmed by the clinical experiments of Double, Chomel, and Villermet, who found that the sulphate of cinchonine and quinine, the most convenient combination to obviate deliquescence, but increase solubility and energy, possess equal efficacy with the bark in preventing the accession of agues, and that on the cinchonine and quinine, the only principles which possess genuine febrifuge properties, depends the power of the genuine Peruvian bark in arresting the progress of intermittent fevers. The clinical experiments of Chomel at La Charité show that the sulphate of quinine possesses the febrifuge qualities of common bark. One or two doses of this salt, varying from six to sixteen grains, generally checked the paroxysm of regular agues. Of thirteen patients ten were cured, five by the first dose, the others after the second. In two of the remaining three, the paroxysms became milder. In the thirteen no abatement took place; and in all the three the ordinary bark was tried with no better effect. These experiments also show that the sulphate of quinine is not followed by the disagreeable sickness and oppression occasionally produced by the bark in substance.

These experiments on the therapeutic effects of sulphate of quinine in ague were repeated in this country by Duncan, Elliotson, and others; in Ireland by Drs Barker, Cheyne, Robinson, and O'Brien; and in Italy by Polidori, Speranza, Marianini, Ramati, Tonelli, and Rossi, with the same general results; and it may now be regarded as established that the sulphate of quinine will in all instances act as bark in ague.

In vernal agues, which I have stated are capable of spontaneous cure, the exhibition of cinchona is probably unnecessary. In autumnal agues, however, it should always be resorted to as soon as possible after intermission, however obscure and temporary. For its safe and effectual administration, the following conditions are believed to be requisite. 1. That it be given early, without waiting until the frequent recurrence of the paroxysms has induced inflammation or congestion in any of the internal organs. 2. The system should be void of inflammatory diathesis, and from symptoms of fixed congestion in the brain or its membranes, the lungs, or any of the abdo-

minal viscera. 3. It should be exhibited only during the time of intermissions ; and while it is rarely retained by the stomach if given in the paroxysm, it is then either not beneficial, or may be injurious. 4. Its administration ought to be begun as soon after the paroxysm, and continued as near to the accession of the ensuing paroxysm, as the state of the stomach and the system at large will admit. 5. It should be given in the proper form, and dose, and quantity. And 6. after the paroxysms have been prevented from recurring, the remedy ought to be continued with the view of preventing a relapse.

1. It was a fancy of Sydenham, Boerhaave, and Van Swieten, that it was improper to administer bark at the commencement of ague, and that it was necessary to wait until some peculiar ferment had been completed. This reason, it is almost superfluous to remark, is quite hypothetical ; and while its truth was questioned by Cullen on theoretical grounds, it was experimentally demonstrated to be unfounded by Cleghorn, Lind, Dr John Hunter, Jackson, and many recent observers. It was even the practice to wait until, by suitable vomiting and purging, morbid matter was supposed to be expelled. But it is ascertained that the sooner the bark is given, the more likely is the disease to be speedily and permanently cured, and all disagreeable consequences prevented. Two reasons particularly require the immediate administration of this remedy. The first is, that in some malignant agues, in bad seasons, a return of the fit proves fatal, either by attacking the brain, or the heart, or the stomach. The second is, that each febrile paroxysm, by accumulating the blood in the internal organs, as the brain, the lungs, the liver, and the spleen, by distending their vessels and impairing their tone, renders them more liable to yield to the orgasm of the ensuing fit. Thus, it has been known that when bark was neglected, or could not be given, headach, pain of the chest or of the belly, dropsical swelling or jaundice, increased after every successive fit, until frenzy or apoplexy, peripneumony or pleurisy, was completely established, or the liver become swelled, and ascites was induced. Of these facts several pointed confirmations are given by Torti, Lind, and Dr John Hunter. Lind especially assures us, that in the epidemic agues of 1765, 1766, and 1767, dropsy or jaundice was the certain consequence of neglecting to administer bark, and that by every paroxysm the

swellings were visibly increased, and the colour of the skin became of a deeper yellow. When the fever continued a few days without remission, besides violent headach and distressing giddiness, the belly and legs generally swelled. Conversely, in more than 200 cases, in which the ague was stopped by bark after the first or second fit, no dropsy or jaundice ensued.

I must observe, nevertheless, that Mutis thought he had reason to infer that the red bark, or that of the *Cinchona oblongifolia*, which is remarkable for its powerful astringency, and a peculiar action, as he conceives, on the muscular fibre, had, when long-continued, a particular tendency to produce visceral obstruction, jaundice, and dropsy. Is there any reason to believe that any species of bark can produce such effects more than another, and that one species may be merely astringent and stimulant, without possessing those unknown qualities which are denominated febrifuge? Such an opinion receives no countenance from the chemical experiments of Pelletier and Caventou, which prove that it is eminently febrifuge.

Moseley also, I must add, thought that the liberal and early administration of the bark had a tendency to produce incurable *phrenitis* or *meningitis*, terminating in mental imbecility and fatuity. Certainly, if, during the existence of such a disease, bark or any other remedy is given while the requisite depletory measures are neglected, I can conceive a disease already existing to continue, or become aggravated. But this I would ascribe rather to the neglect of the proper measures, than to any peculiarly deleterious property in the bark.

2. This circumstance leads me to observe, that, in order that bark should prove sanative, it is indispensable to remove previously all symptoms of local inflammation or congestion, by the preliminary employment of blood-letting, general or local, and other antiphlogistics, especially blisters to the occiput and neck, in affections of the head, scarifications and cupping or blisters and antimonials in disorders of the chest, and cathartics in those of the belly. The particular means adapted to each have been already detailed. It may be proper, however, to mention here, that the reason for the employment of these means is, that, so long as a febrile state of the system, or much inflammation of a particular organ, subsists, the bark does not operate with effect. As soon, however, as these are subdued, the disease almost immediately becomes amenable to its influence. These facts were proved to demonstration in the ague of

North America, as treated by Dr Jackson in 1778. It is found, however, to be unnecessary to attend to every slight chronic ailment; and Lind neglected cough, dropsical effusion, and even jaundice, in the exhibition of this remedy.

3. During the paroxysms of ague, the stomach and bowels are so irritable that bark cannot be borne, and is necessarily rejected. The reason of this rule, therefore, is obvious. An exception to it, however, has been conceived to exist in the case of agues with urgent symptoms, in which Senac and Alibert allow that it may be given during the paroxysm, and in the case of quotidians and double tertians, in which the intervals are short and incomplete, and in which, consequently, it is vain to wait for the intermission. In such circumstances it is important to know, that Dr Clark of Newcastle found it both safe and necessary in the intermittents of China and this country, to administer bark during the paroxysms. He admits, indeed, that when he administered two drachms at the accession, and again at the middle of the paroxysm, the former dose was frequently rejected; and he therefore partially adopted the old practice of giving it two hours before the paroxysm; and then at the close of the cold fit he gave an opiate, and at the beginning of the sweating fit two drachms more. By this management, he assures us, the medicine was retained; and the disease was removed, it is said, by half the quantity required when confined to the intermissions alone. While this practice, the admissibility of which is confirmed by Heberden, does not contradict the rule now established, it only furnishes strong confirmation of the necessity of the subsequent one.

4. If it is practicable to administer bark at the beginning and in the course of the sweating fit, as now stated, it is always desirable to commence its administration immediately after the paroxysm is finished, and in urgent cases to give it as frequently as the stomach will bear before the ensuing accession. It has been indeed maintained by some, among others by Cullen, that the practice observed by the older practitioners, of giving a large dose as near the time of accession as possible, was the most likely to prevent the formation of the paroxysm, and he recommended at least frequent small doses every hour before the expected accession of the fit. It might be inferred, from every thing we know regarding the nature of intermittents, that the sooner bark is given after the paroxysm is over, as there is

longer time to give more of it, and to admit of its perfect operation, whatever that may be, the more likely will it be to effect in the system those changes which are inconsistent with the return of the paroxysms. Theory, however, it must be allowed, is in this case of little avail; and experiment is unluckily contradictory. Thus Torti remarked, that, by giving frequent small doses soon after the paroxysm, and continuing them till near the time of the next, more effect was produced than by large doses immediately before the paroxysm. Home also found that bark given immediately before the accession did not prevent that fit, but prevented the subsequent one. Dr Clark of Dominica, on the contrary, confirms the rule of Cullen, by stating, that one ounce of bark given eight or ten hours before the paroxysm of an intermittent, has more effect in preventing its accession and stopping the disease than double that quantity taken at a considerable distance of time before the cold fit (p. 95). Davis in the ague of Walcheren in 1808, gave it in full doses every two hours during the interval, and a double dose immediately before the invasion of the cold fit, —apparently with much benefit. On the whole, it may be inferred, that though bark may be given a few hours before the accession of the cold fit with the chance of preventing the paroxysm, that chance is much augmented by commencing with it as soon after the close of the last fit as the stomach of the patient, and the necessary administration of other remedies, will allow.

5. Bark has been administered in substance, in vinous or spirituous tincture, in watery infusion or decoction, in the form of extract, and finally in the chemical preparations obtained from it. Of all the forms excepting the last, that of substance is certainly the most efficacious and the most to be depended on. It is doubtful whether either vinous or spirituous tinctures extract the febrifuge powers of the medicine; and, at all events, the spirituous would heat and intoxicate before it produced the proper tonic effect. It has been also found that after the infusion or decoction had been given without avail, the powder from which they had been prepared was eventually administered with the proper effect. For these reasons, therefore, the powder or substance has been always given where the symptoms required a decided effect. It may be given in the dose of from a scruple, or half a drachm, to two

drachms, every hour or two hours, according to the endurance of the stomach, and its effects on the system generally. Few stomachs can bear two drachms at once; and, therefore, it is necessary to begin with doses of a scruple, or, if this should be rejected, with ten grains only. According to Mutis and Zea, two drachms of true yellow bark are sufficient to prevent the access of a paroxysm. But experience shows that this cannot be applied to every kind of bark, nor to agues of all seasons and climates, and that it is requisite to exhibit a much greater quantity with the view of preventing the recurrence of a paroxysm. In general, it is impossible to expect this result from a smaller quantity than half an ounce given during the interval; more frequently it is necessary to give six drachms, as was done by Cleghorn, or an ounce or one and a-half, as was done by Lind. When the intervals are short, as in quotidians and double tertians, from one drachm to two drachms should be taken every two hours, till an ounce and a-half or two ounces are taken. In the ague of North America, Jackson found two drachms given every two hours during the apyretic space, until three or four ounces were taken, requisite to remove the disease. In urgent cases the dose was increased to half an ounce or more; and two ounces thus taken in eight or ten hours were often more effectual than double the quantity in small doses, and at long intervals.

The most convenient mode of taking bark in substance is by suspending it in milk, or coffee, beer, or porter, or a little wine; and in either case it should be drank off immediately, to prevent it from imparting a bitter taste to the vehicle. The employment of wine is always admissible when there are no evident marks of inflammation; and in such circumstances it contributes to make it sit more easily on the stomach, and to augment its tonic and febrifuge properties. Pure spirit is in consequence of its intoxicating power, rarely admissible as a vehicle; but under particular circumstances, a small quantity, as half an ounce or an ounce, may be given with advantage. Coffee, which has been of itself represented to be efficacious in removing intermittents, and contains caffen, is a very useful vehicle.

The bark given by the mouth often produces insupportable squeamishness and sickness, and is at length rejected; and child-

ren it is always difficult to induce to swallow a medicine so nauseous. Under these circumstances it may be administered as a clyster with a small quantity of opium to insure its being retained; and in this mode, which was first practised successfully by Baglivi, and revived by Comparetti, Lind, and the physicians of Montpellier, the second asserts, he found it equally effectual as when given by the mouth. A cathartic glyster should be previously administered, with the view of exposing the mucous surface of the intestines, and thereby rendering it more powerfully absorbent. The bark should then be injected every three or four hours till an ounce and a-half or two ounces have been given.

With the same view it has been applied externally in various modes. Lind, for example, ordered it in children to be mixed with theriac and camphor, and applied in a poultice to the stomach or wrists, or sewed between the folds of a linen jacket, and worn next the skin, and infants to be immersed in a bath of decoction of bark. The last method, at least that of immersing the feet for an hour or more, Heberden assures us he has seen tried without effect. Barthez, however, used it successfully in a girl at Montpellier; and Mestivier cured by it a Russian princess labouring under a very alarming ague. (Alibert, p. 360). Brera, and other Italian physicians have employed another form of the external application, by rubbing the extract with gastric juice, saliva, or honey, on the epigastrium or inside of the thighs; and in this it is said absorption is effected.

Sulphate of quinine may be administered in every form, and under all circumstances in which bark is indicated; and, indeed, it possesses so many advantages, that it may supersede the use of the bark in substance almost in every case. It may be administered in much smaller compass, in a more commodious form, and it does not so frequently induce the insupportable squeamishness and sickness with which, in many individuals, a full dose of bark is followed. The dose varies according to the age of the individual, the duration of the disease, and especially according to the season and the climate. The average dose for adults in this country is from three to five grains, administered every two or three hours during the intermission. According to Dr Barker of Dublin, however, smaller doses than this are equally effectual. Of thirty patients treated by

it, not one resisted its influence; and in a majority of cases, the disease ceased within a day or two after the first dose was taken. It was found that one grain or less, taken three or four times daily, was equally efficacious as larger doses; and in one of Dr Morgan's cases, half a grain, given three times daily, suspended the paroxysm for eight days. (Transactions of Association, iv. p. 270.) The average quantity requisite to cure an ordinary case of ague amounts to somewhat more than nine grains.

In aguish districts, however, and warm climates, larger doses and larger quantities of the remedy appear to be requisite to produce the effect. In the aguish tracts of Italy, in the Roman territory, and the Maremma, the small doses are found to be inadequate; and physicians are in the habit of giving twelve, twenty-four, or thirty grains according to Professor Speranza; and in one case Menard appears to have carried the dose in seven days to 108 grains before the ague was arrested.

In America, in like manner, it has been found requisite, according to Dr Henry Perrin, of Adams' County, near Nat-chez, to give it in doses of six, eight, or twelve grains, repeated every two or three hours, so long as the symptoms or the pulse and skin are unrelieved. The medium dose is eight grains; and from twenty to sixty-four grains might be requisite before the febrile symptoms gave way. In the island of Santa Cruz also, my friend, Dr George W. Stedman, informs me he found it requisite to administer it in doses of ten, twelve, or fifteen grains in the course of the day. This corresponds with the observations of Jackson in the ague of North America, as to bark in powder.

It may be given in glyster with good effect in the same manner as the bark in substance, and with the same conditions. It has also been applied by Lesieur endermically to skin deprived of the cuticle by previous blistering, with good effect. It requires to be mixed with hog's lard, or simple cerate, as when pure it irritates the skin, and is liable to cause sloughing.

6. After the paroxysm of an intermittent has been prevented from coming on, it is requisite to prevent its recurrence. In aguish districts and seasons, and in hot climates, agues, when once removed, are liable to recur, especially on some of the days on which the fits, if not prevented, would have, in the regular course, taken place. In the ague of North America, according to Jackson, though relapses took place on the 6th,

8th, 12th, 14th, 20th, 22d, 28th, and 30th days from the suppression of the fit, the 14th, 16th, 8th, 12th, 20th, and 22d, in the order now mentioned, were the most usual days. Hence he found it necessary, as a precautionary measure, to exhibit bark on the 5th, 7th, and 13th days; and he continued it till the suspicious period was elapsed. Clark of Dominica also informs us, that if no more bark is taken in the West India ague than is barely sufficient to stop a fit, a relapse may take place on the 8th day in the quotidian, on the 14th or 15th in the double tertian or tertian, and on the 21st or 22d in the quartan, making in each type seven periodical revolutions from the time the fit was suppressed to the next attack; and that the fit returned on the same day, at the same hour at which it would have done, if its course had not been interrupted by the administration of the remedy. As these relapses could not be traced to errors in diet, or other palpable cause, he ascribed them to some habit contracted by the constitution.

Whatever may be the cause, the effect is manifest and undisputed; and it affords a very excellent principle for the therapeutic rule of administering bark, so long as there is reason to believe this habit is not entirely interrupted, and to administer it especially immediately before the apprehended periods. With this intention, therefore, bark or sulphate of quinine should be given in liberal doses after the paroxysms have been checked; and continued occasionally for weeks, or even months, more especially when the atmosphere is damp, when the wind is from the east, or when the state of the weather indicates sudden and extreme vicissitudes.

Some physicians have imagined that bark exhibited alone was either not efficacious, or was injurious; and that efficiency and safety were insured by combining various saline, aromatic, or tonic substances. Thus Cleghorn combined it at first with Glauber's salts; and Chalmers believed, that, unless it was united with snake-root and Glauber's salts, or salt of wormwood, *i. e.* carbonate of potass, it was liable to induce dry-belly-ache, or obstruction of the liver and spleen. From the observations of Jackson and others in North America and the West Indies, there is reason to believe that snake-root powder occasionally facilitates its endurance by the stomach, and thus seems to promote its operation on the economy. Dr John Hunter was occasionally in the habit of adding sal-ammoniac

or alum to bark; but he states that they did not seem to be powerful. Subsequently, however, he found, in the treatment of the agues of London between 1782 and 1788, calomel in doses of three or four grains, with fifteen or twenty grains of jalap, so as to purge, rendered the operation of the bark more efficacious. (Observations on the Diseases of the Army, &c. p. 211.) This, however, was not a combination so much as a remedy to remove a previous morbid state. From the testimony of Sir George Baker, we know that bark appeared in these agues to be less efficacious than formerly; and, from several of the facts communicated by that author, especially one of complete cure after salivation, there is strong reason to believe, that a state of congestion of the gastro-enteric and hepatic, or splenic systems, was the cause of the disease previously resisting the use of the remedy. (Med. Transactions, iii. Art. 13, p. 141-149.)

The expence of genuine Peruvian bark, its occasional scarcity, and the difficulty of always procuring it, have led to the use of various substitutes, which have been found more or less efficient in the cure of agues.

a. The first entitled to regard are the various sorts of Caribbean bark, or bark of the Antilles or West India Islands, all of which are obtained from trees, which, though found abundantly in these islands, grow also in Peru, Brazil, and Australasia. These trees were, when first introduced into notice, believed to be species of *Cinchona*; and, though the physiological and therapeutic properties of their bark were so different as to render the accuracy of this notion doubtful, they were long continued, in more or less general use, before the mistake was detected. It is found, that, though allied in external figure and general characters, they are botanically distinct from *Cinchona*, and they have therefore been separated from them under the general name of *Exostema*. The principal that have been used in the treatment of ague are the *Exostema Caribæum* or Caribbean, or Jamaica false cinchona, the same as that described by Dr Wright; the *Exostema floribundum*, or St Lucia bark, *Quinquina Piton*, or mountain bark of the French; the *Exostema brachycarpum*, or Country bark, used by Clark of Dominica; and the *Exostema angustifolium*, or Hispaniola bark.

All these barks agree in being intensely bitter and astringent,

and exciting more or less vomiting and purging, which are particularly violent in the case of the first and third, and which Clark ascribes chiefly to the first infusion, the second being much less so. By the aborigines and the negroes they were employed to cure agues; and their resemblance in appearance, general aspect, and sensible qualities, brought them into notice among Europeans. They have been found, however, ineffectual, or at least not more effectual than other bitters. This may now be regarded as explained by the fact, that neither of these barks contain cinchonine or quinine; and that their active principle is chiefly an astringent bitter, probably an alkaloid more or less emetic. According to the analysis of Pelletier and Caventou, that of the St Lucia bark (*Exostema floribundum*), approaches closely to emetine. If these barks be employed as mere astringent bitters in the treatment of ague, the advice of Dr Clark, to reject the first infusion and make a second, which is to be given to the extent of a quart daily, ought to be adopted. By the infusion administered in this manner for two or three days, he informs us he has cured tertian agues and obstinate quartans by means of the powder. (P. 98.)

b. The bark of two species of *Portlandia*, the *P. grandiflora*, and the *P. corymbosa*, have been also employed as substitutes for Peruvian bark. The first, which has been known in commerce under the name of *Kina Nova*, contains principally a peculiar acid, named the *kinovic*, some resinous matter and tannin. The second probably contains the same ingredients. The bark said to be obtained from the *Portlandia hexandra*, and analyzed by Pelletier and Caventou, contains cinchonine, and is justly regarded by M. Fée as the bark of a genuine *cinchona*. (Cours d'Histoire Naturelle Pharmaceutique, ii. p. 266.)

It is a singular circumstance, that, in the countries which produce *cinchona* trees, the *Angustura* bark, or that of the *Bonplandia trifoliata*, is esteemed more efficacious against agues than the true bark. The bark of *Angustura* is a strong but not disagreeable bitter; but, though it contains an azotic principle analogous to cinchonine, it is said to possess no specific power against agues. Dr Hancock, however, found it superior to *cinchona* in a malignant bilious intermittent, which proved very fatal to inhabitants as well as strangers at St Thomas, on the Orinoco, in 1816 and 1817.

The bark of the common mahogany (*Swietenia mahagoni*), and of the East India mahogany (*Swietenia febrifuga*), both of which are bitter and powerfully astringent, have been also used instead of Peruvian bark. The latter, which grows on the Coromandel coast, may be useful in the east, when bark or sulphate of quinine cannot be obtained. It is given in substance in doses of half a drachm of the powder every two hours, or in decoction made by boiling six drachms in a pint of water.

The bark of the tulip tree (*Liriodendron tulipifera*), which, though a native of North America, is now habituated to the middle and southern regions of Europe, is employed in the United States against agues. It is simply bitter, without tannin or gallic acid, and consequently must be supposed to act as a simple tonic.

c. The next class of substitutes may consist of those which contain tannin and gallic acid, with some bitter principle, and are therefore powerfully astringent. These are useful only in simple agues without gastro-enteric or hepatic congestions; and if used in such cases are liable to induce dropsy.

Oak bark (*cortex Quercus roboris*), and galls (*gallæ Quercus infectoriæ et Q. cerris*), have both been employed in the treatment of ague. Both contain a large proportion of gallic acid and tannin, to which they owe their astringent properties. The former, which, from its astringency, was supposed to possess the virtues of Peruvian bark, has occasionally been found capable of removing ague. The latter, which has been long employed in Asia for the same effect, may also be supposed to be useful. Both substances, however, are accused, in consequence of their strong and pure astringent properties, of laying the foundation of visceral obstructions. The dose may vary from a scruple to a drachm, three or four times daily in the interval; and if they are combined with the carbonate or nitrate of potassa, perhaps the violent constrictive effect might be obviated. To the same head we must refer the use of the misletoe.

The bark of the horse-chestnut (*Æsculus hippocastanum*, *Hippocastanum vulgare*), has been much employed as a substitute for bark on the continent. Besides tannin and gallic acid, it is known to contain some resinous matter, a greenish oily substance, some bitter principle, and a matter of animal qualities. It was recommended for its febrifuge powers by Zannichelli,

a Venetian druggist, in 1733, by Turra in 1780, and by Zulati in 1794, in agues with sthenic diathesis. But these recommendations rested on the ground of erroneous analysis; and they have not been confirmed by clinical trials. It was given in doses of from one scruple to one drachm, twice, thrice, or four times daily. It possesses no advantage over the other astringent vegetable bitters.

The bark of the white willow (*Salix alba*), which has been long in popular use, was employed in treating agues by Stone, Gunz, James, White, and Wilkinson; and it was examined chemically, first by Bartholdi of Colmar, and then by Pelletier and Caventou, who found, however, in it no alkaline principle like quinine or cinchonine, but tannin, resin, and some bitter astringent matter. Fontana, on the contrary, recognized a substance with alkaline properties, to which he gave the name of *salicine*, and which he maintains is febrifuge. The existence of the same principle is maintained also by Buchner, and recently by Leroux; but its power over ague is very questionable. The dose of the pulverized bark is from half a drachm to a drachm three or four times daily. A more eligible form, however, is said to be that of decoction in the proportion of two ounces to one and a-half pint of water boiled to one pint.

The bark of the crack willow (*Salix fragilis*), and the Huntingdon willow (*Salix pentandra*), possess the same qualities, and may be employed in the same manner.

The bark of the ash (*Fraxinus excelsior*), was, in 1712, recommended by Helvig with the most lavish encomiums as a substance possessing all the virtues of Peruvian bark, (*Helvig de Quinquina Europæorum*, 1712, *Gryphiæ*),—a statement which Pearson has erroneously made regarding oak-bark. These eulogies rest on no good foundation. The ash-bark is simply an austere bitter, which possesses no advantage over the bark of similar trees.

To the bark of such trees as the service tree, (*Sorbus aucuparia*), hornbean (*Cratægus Aria*), birch (*Betula alba*), alder (*Alnus glutinosa*), apple tree (*Pyrus Malus*), and medlar (*Mespilus Germanica*), all of which contain more or less tannin, sometimes with acids, and possess more or less stypticity and bitterness, it is unnecessary to advert particularly. The pericarp of the pomegranate named *malicorium*, possesses a powerful

but grateful degree of styptic bitterness, and has been employed in the same manner.

To the same head may be referred the roots of bennet (*Geum urbanum*), and tormentil (*Tormentilla erecta*), both of which contain a large proportion of tannin and gallic acid. From a scruple to a drachm of either may be given three or four times daily.

All the remedies of this class are contraindicated in cases of evident or suspected visceral obstruction.

d. The fourth class of substitutes may consist of those which contain various bitter principles, as gentianin, strychnine, picrotoxine, &c.

α. Substances containing gentianin appear to possess some anti-paroxysmal efficacy. The ordinary gentian (*Gentiana lutea*), which is a native of Europe, and the Chirayita (*Gentiana Chirayita*), which grows on the elevated parts of Coromandel, and which contain, with resin, much gentianin, have both been found useful in removing agues. To the same head we may refer the marsh trefoil or buckbean (*Menyanthes trifoliata*.)

β. Substances containing strychnine have been occasionally found effectual in curing agues. Thus, St Ignatius' bean was in great use for this purpose at one time among the Spanish physicians, by whom it was denominated *Faba febrifuga*; and on the credit of this reputation it was tried by Lind with partial success. Strychnine, which in this, in the *S. nux vomica* and the *S. colubrina*, is combined with a styptic bitter crystalline substance of acid properties, named the *Igasuric*, is in all probability either by itself, or as an igasurate, the active remedy. On its precise febrifuge powers, however, we want clinical information.

γ. Other herbs, containing principles producing on the economy similar effects, have at different times been employed in the treatment of obstinate ague. Thus wolfs-bane (*Aconitum napellus*), which contains a peculiar alkaline base of very active properties, leopards-bane (*Arnica montana*), which contains cytisine, with a little resin and gallic acid, and the twigs of the bitter-sweet (*Solanum dulcamara*), which contain solanine, have all been employed with different degrees of success in subduing agues.

The first may be given in the powder of the dry leaves, at

first in doses of two grains, which are afterwards increased to four or five; or the inspissated extract may be given, first in doses of half a grain, augmented gradually to two or three grains, four times daily.

The second is generally best given in the form of infusion of the leaves,—one or two scruples being infused in a pint of water. The dose of the powder of the root, which is also given, is from five to ten grains. The flowers of leopardsbane, which were much used by Stoll, are highly commended by Joseph Frank in autumnal tertians and quartans, with tendency to visceral obstruction and œdema.

Bitter-sweet has been hitherto given in decoction of the twigs.

δ. Substances containing picrotoxine have also been employed with the purpose of curing intermittents.

The berries of moonseed (*Menispermum cocculus*), which owe their intense bitterness to the presence of this principle, have been occasionally employed in minute doses; but it is not a very safe remedy, and its efficacy is questionable.

A more suitable and useful remedy is found in the calumbo root, (*Menispermum palmatum*, *Cocculus palmatus*), which has been long in use as a tonic, and which has been very generally regarded as a valuable remedy in the intermittent fevers of India. It is, indeed, not certain that this root contains picrotoxine; and it is at least certain that it contains other principles, especially an azotised matter and starch, with a volatile oil; but, as it belongs to the same genus, it is not unlikely that it owes some of its peculiar bitterness either to this or some similar principle. Half a drachm of the powder may be given several times daily; but the cold infusion is most frequently used.

The leaves of the cherry-tree laurel and its water have been used for the cure of ague; but it is not easy to say whether this depends on the oil or on the prussic acid which they contain. Both are powerful agents; but the former is least liable to decomposition, and therefore appears in this instance to be the remedial means.

e. The fifth class of substitutes for *cinchona* are those containing piperine, or the crystalline salt of pepper, with volatile oil, or volatile oils with resin, and which thereby appear to excite the gastro-enteric capillaries more or less directly, and

when absorbed, to stimulate the glands generally, and the kidneys particularly.

It has been long a common practice among the vulgar to attempt the cure of ague by swallowing a tea-spoonful of pepper in ardent spirits; and occasionally the remedy was successful. The explanation of this is probably to be found in the fact, that chemical analysis has succeeded in obtaining from the different species of pepper an amber-yellow crystalline, cauliflower-like insipid mass, which has been in some trials found so efficacious in the removal of ague, as to be equal, or, according to Meli, superior, in power to that of the sulphate of quinine itself. The experiments of Meli were repeated at the hospital of Leghorn by Dr Gordini, who inferred from them, *1st*, that piperine in doses of six or eight grains cures intermittents; *2d*, that it is more efficient in powder than in pills; *3d*, that it succeeds in certain cases in which sulphate of quinine fails; and *4th*, that it is more effectual in preventing relapses. These results have been in general confirmed by Levisseur, Wolf, Lucas, and especially by Riedmuller of Nuremberg.

Pepper also contains a volatile deep-green acrid oil, which is said to be febrifuge, though in a slighter degree than piperine.

Chamomile flowers have been long in use for the treatment of agues previous to the discovery of the bark; and since the introduction of that substance, agues, which have withstood its action, have been known eventually to yield to the use of chamomile. Thus Morton found it when conjoined with antimony, capable of removing agues on which bark had made no impression. Dr Donald Monro found the same remedy equally successful in the obstinate agues of Embden, (*Diseases of Military Hospitals*, p. 200); and Dr John Hunter states, that in the intermittents of Jamaica, half a drachm or a drachm of the flowers reduced to fine powder, repeated every third hour, often stopped the fever after bark failed. (*Diseases of the Army*, chap. iii. sect. v. p. 210.) Heberden also found that one scruple of the chamomile flowers removed agues which had resisted drachm doses of the bark. (*Commentarii*, p. 161.)

It is now known that this substance, besides a peculiar bitter and tannin, contains some piperine, and an aromatic azure blue oil, separable into a volatile and concrete part, the latter of which is camphor. It is not unlikely that the febrifuge powers of these flowers depend partly on the piperine, partly on the aromatic oil.

A similar oil is found in the feverfew (*Matricaria parthenium*), millefoil (*Achillea millefolium*), tansy (*Tanacetum vulgare*), and the species of *Artemisia*, all of which have been occasionally used in the treatment of the disease.

I scarcely know to what head I should refer the alleged febrifuge powers of the root of the sweet-scented flag (*Acorus calamus*, *Calamus aromaticus*), the powder of which, distinguished only by its volatile oil and resin, has been long in use among the lower orders of people in Sussex for curing ague, and has been employed successfully by many physicians, and among others by Heberden and Baillie, (Observations in Medicine,) for the removal of the disease. The dose is two scruples; and Moseley gave it in the agues of Jamaica in this dose three, four, five, or six times daily, as the intermission and stomach would permit, in a glass of wine, or strong infusion of snake-root. It is also extremely useful as an auxiliary to the sanative powers of bark or sulphate of quinine, and with this view the volatile oil may be employed in combination with the latter.

f. To the sixth class may be referred substances which, with a bitter principle, contain resin and volatile aromatic oil, in consequence of which they act on the system as warm pungent tonics, promoting the circulation of the gastro-enteric organs generally, and that of the portal vein, and occasionally acting on the vessels of the kidneys, and by augmenting the urinary secretion, diminishing congestion, and obviating visceral obstruction (*emphraxis*).

Cascarilla bark, obtained from the sea-side balsam of Browne, (*Croton cascarilla*, *Croton eleutheria*), was much and confidently used in the treatment of agues by Stahl and his followers, who, from speculation, had an aversion to the use of *cinchona*. It is chiefly a pungent, aromatic bitter, containing much resin and volatile oil. Though much used in the native practice of the West Indies, it possesses no specific powers over ague.

The same, perhaps, may be said of the Virginian snake-root, (*Aristolochia serpentaria*), which alone, or conjoined with bark, has been believed to be useful in the treatment of intermittents. Its stimulant properties enable it to sit more easily on the stomach, and to contribute to maintain the circulation of the mucous and cutaneous surfaces. Alone, however, it cannot be trusted to as a febrifuge; and when it has been found beneficial, it has been either as a temporary substitute for bark, or

as a simultaneous adjuvant. Chalmers, for instance, found it very useful when given with bark and carbonate of potass; and Jackson informs us that it was the practice of the country people of Carolina to attempt the cure of ague by means of snake-root given in doses of two scruples or half a drachm. Alone, however, he found it on trial unavailing; but when conjoined with bark in the proportion of two drachms to an ounce, it effected complete and permanent cures. (*A Treatise on the Fevers of Jamaica*, p. 321).

Strong infusion of coffee, the dried berries of the coffee plant, has been often used advantageously to prevent the return of the aguish paroxysm. This substance contains caffen—a crystalline principle void of alkaline acrid properties, and containing much azote. It is useful at least as a vehicle for other remedies.

g. The exhibition of charcoal for the cure of ague, as a substitute for bark, appears to have been practised in 1813 by Calcagno at Palermo, and afterwards by Dr Calvert, Mr Mackesy, Mr Tully, and other English practitioners, in Sicily, (*Med. and Surg. Journ.* x. 15, 403); and it was used with that intention by Dr Jackson in the West Indies. In simple ague it seems to produce little or no benefit. But in ague with affection of the gastric, or the hepatic, or gastro-enteric circulation, in ague with anguish at stomach, squeamishness, flatulence, or hiccup, and in dysenteric ague, its sanative influence is unequivocal and powerful. It may be given in doses of from ten to twenty grains in rice-water or arrow-root, either alone or with six or eight grains of rhubarb, and two or three grains of powder of ipecacuan. It appears to operate chiefly by rectifying disordered secretions of the stomach and bowels.* Dr Shortt, my colleague in the Royal Infirmary of this place, informs me that he has cured, by the use of this substance, twelve cases of very obstinate ague. It is probably by its charcoal, that the snuff of a candle, which has been alleged to be beneficial in curing ague, as mentioned by Lind, operates.

h. I may next advert to the use of an animal product which has been employed with success by different physicians for the cure of ague. I allude to cobweb, the secretion of the black spider, which inhabits cellars, barns, and stables. Paullini informs us

* *A Sketch of the History and Cure of Febrile Diseases.* Stockton, 1817. p. 271.

that his uncle was freed from an obstinate tertian of nine months duration by three spiders administered without his knowledge in bread and butter, by the advice of a Jew. Lind mentions, among remedies in popular use for the cure of ague, a common spider gently bruised and wrapped in a raisin, taken either in the cold fit, or three successive mornings;—and five grains of cob-web mixed with crumbs of bread, twice daily. The disappearance of the disease under the use of these means, which occasionally took place, has been very generally ascribed to the influence of imagination.

Little serious attention, therefore, appears to have been given to the subject till March 1760, when, on occasion of the prisoners being landed on the Isle of Man from the vanquished squadron of Thurot, Dr Gillespie, then a practitioner in that island, finding that the numerous cases of ague which had appeared both among the prisoners and the inhabitants obstinately resisted bark and other remedies, was informed by an old French physician from the squadron, of the alleged efficacy of cobweb in certain forms of the disease. Upon subjecting the remedy to trial, he found it to answer the character given; and he afterwards experienced its efficacy, not only in more than sixty cases of ague of different types in that island, but subsequently in Ayrshire, where Dr Gillespie practised previous to 1779, when he removed to Edinburgh.

From the late Dr Gillespie, these facts regarding the efficacy of cobweb in the treatment of ague were communicated to Dr Jackson; and by him, as well as by my friend, the present Dr Gillespie of this city, to whom I am indebted for this information, the remedy was subjected to extensive trial in the treatment of ague in the West Indies in the course of 1796 and 1797. The observations of Dr Jackson on its therapeutic powers were made in the hospital of the army depot of the West Indies in 1801. Several cases of ague, on which bark, arsenic, or mercury, singly or alternately, had either made none or a very temporary impression, were selected for experiment; and in four of these cases, two pills, containing each five grains of cobweb, were administered at intervals of two hours, commencing six hours before the anticipated time of the return of the fit. The fit did not return; and health was restored in some instances speedily, in others slowly. On subsequent trials, it was found not only to arrest the course of

agues, but to remove various symptoms, as pain, spasm, delirium, vomiting, griping, and other symptoms of irregular innervation, in ague and continued fever, wherever these symptoms were unconnected with congestion or inflammation in the substance of organs. To insure its efficacy in ague, it is requisite to be preceded by blood-letting, the use of emetics or purgatives.

i. Subcarbonate of potass, under the name of Salt of Wormwood (*Sal Absinthii*), was, previous to the introduction of the bark, much celebrated as a remedy for ague, either alone, or in combination with bitters, tonics, or astringents; and, even after the introduction of the bark, it was much used for the removal of certain symptoms. In this manner its virtues were acknowledged by Morton, Mead, Cleghorn, Chalmers, Lind, and others. The effervescing draught before the paroxysm, or at any time when heat and thirst are intense, is one mode of giving it, as Morton and Cleghorn did. But it is in this form less efficient as an antacid and a saline diaphoretic and diuretic, than in the shape of the pure subcarbonate or carbonate, of which from five to fifteen grains may be given every two hours, either alone, or with sulphate of quinine, rhubarb, chamomile, or cascarilla. It is chiefly indicated where there are symptoms of acidity of the stomach, with fulness and distension of the abdomen, inactivity of the hepatic and gastro-enteric circulation, and scanty high-coloured urine. It is said to render quinine and the astringent principle insoluble; and it is not improbable, that in this manner it has counteracted the injurious effects of these principles in the treatment of agues. It is, on the contrary, certain, that it increases the solubility of the resinous and oily principles of vegetables, and may, therefore, by augmenting their penetrativeness, augment their activity on the system. It is probable that it is on this principle that it proves so beneficial, when combined with snake-root, chamomile flowers, and similar substances, as in the febrifuge powders of Morton and Mead. Its effects are to rectify acidity, to modify the gastro-duodenal and hepatic circulation, and, when absorbed, to act on the glands generally, and thereby on the kidneys in particular, and thus diminish visceral congestion, and obviate obstruction.

It is probably by reason of its antacid powers that ammonia itself has been found useful by Agricola, Hartmann, and Et-

muller. It is indeed regarded as a diaphoretic, and perhaps it does produce some effect in this way. But there is reason to believe that it acts first by saturating acid, and dissolving and removing viscid mucus in the stomach and duodenum, and then by correcting the secretions and circulation of the gastro-enteric surfaces generally.

Ammonia, however, has been given, not only in the pure but in the neutral form.

Sal ammoniac (*murias v. chloras ammoniæ*), has been much used in the treatment of ague by Sennert, Primrose, Dolaeus, Dekkers, &c. but, above all, by Muys, a physician at Franequer, who gave it in 1702, 1703, and 1704, most extensively, and, by his own account, with very great benefit. The salt was given in doses of one scruple, two scruples, one drachm, a drachm and a-half, or two drachms, previously dissolved in an ounce of boiled or distilled water or beer, half an hour before the accession of the paroxysm, or, if this could not be ascertained, at the first approach of shivering. The effect of this was, in a majority of instances, to stop the progress of the paroxysm; and if this did not take place, to mitigate its violence. The remedy was, however, repeated in the same manner, in either case, before the expected period of the ensuing paroxysm; and the ague was either entirely cured, or, after a few symptoms, spontaneously but finally left the patient. In this manner Muys treated many simple tertians and quotidians; and he remarked, that the former less frequently required a third dose of the sal ammoniac than the latter. Of twenty-two simple tertians, indeed, and six quotidians and double tertians, fourteen cases were cured by a single dose; and of the other fourteen, in three the disease appeared to undergo no change; in one the paroxysm was aggravated; and in all the rest the disease disappeared after the second dose. In quartans, according to the experience of his brother, it was found of little avail. But, on the whole, Muys concluded that sal ammoniac ought to be regarded as at least equal, if not superior, to bark. In the use of this remedy, it is somewhat singular that Muys interdicted the use of cold water as a drink in the fit, and allowed the patient to rinse the mouth only with beer, or tea, or coffee, yet permitted him to eat pork and fish.*

The efficacy of sal ammoniac has also been much commend-

* Wyeri Gul. Muys Diss. de Salis Ammoniaci ad Feb. Intermitt. usu, 1716.

ed by Boerhaave, Werlhof, and Senac, Tilingius, Lautter, Jacobi, and Loeseke. It was given along with bark by Dr John Hunter, in the agues of the West Indies, with occasional benefit.

Acetate of ammonia, or citrate of ammonia, may be given during the paroxysm, as a refrigerant, diaphoretic, and diuretic.

k. Among the mineral astringents and tonics, alum, the salts of iron, zinc, copper, lead, mercury, arsenic, and gold, have been occasionally used for stopping the course of agues.

α. Alum, like most similar remedies, is stated by Etmuller to have been used in the empirical treatment of agues with great success; it is much commended by Hartmann and Grunling; Boerhaave used it, combined with mace, and Armenian bole; and Mynsicht, with the dragon-tree gum. Besides its astringent power, it is believed to operate as a resolvent or deobstruent. It may be given in doses of one scruple with nutmeg, or mace, and nitre, every hour before the approach of the fit. Like sal ammoniac, it was occasionally given with bark advantageously by Dr John Hunter in the agues of the West Indies. (P. 211.)

β. The salts of iron are still much given by physicians, and popularly in fenny districts, for the cure of ague. In Essex it is not uncommon to exhibit a sulphuret prepared by melting sulphur with iron filings. The sulphate, muriate, and carbonate, are the preferable forms; and the first was given by Marc to the extent of 17, 27, and 54 grains daily, or a drachm in the course of twenty-four hours. (*Recherches, à Paris, 1810.*) A combination of sulphate of iron with nitre was formerly celebrated for its efficacy under the name of the *febrifuge salt* of *Moebius*. Another combination much commended by Hartmann, was the martial flowers of sal-ammoniac, which is represented by the ammoniated iron of the London, and the muriate of ammonia and iron of the Edinburgh Pharmacopœia. A third preparation still more famous, is the *crocus martis antimonialis* of Stahl, which is merely minute particles of iron obtained by elutriation from the dross of the martial or iron regulus of antimony. Stahl, who preferred it to bark, gave it in doses of two, four, or six grains, with powder of dog's-tongue (*Cynoglossum officinale*) with the best effects. It is a powerful remedy; but its effects have been probably overrated.

γ. Of the preparations of zinc, the flowers or oxide were found by Dr Hendy of Barbadoes to remove agues which had resisted bark and all other remedies; and Sir Gilbert Blane, in like manner, found it effectual in three out of five of agues of long standing, without, however, organic complication, and with distinct intermissions. The dose is from two to four grains every six or eight hours.

The sulphate, the white vitriol of commerce, has been long advantageously employed in the cure of ague in the fenny counties of England, in doses of one or two grains three times daily. In the agues of Sicily, Dr Irvine gave one grain and a-half every two hours with more benefit than bark itself. In those of the West Indies, several surgeons of the fleet found it most beneficial in doses of five grains every four hours; and Sir Gilbert Blane used it with advantage in St Thomas's Hospital for the same purpose. By Sir James M'Grigor it was given to the amount of half a drachm daily in the agues of the Peninsula.

δ. Of mercurial preparations calomel has been most frequently given for the cure of ague. Void apparently of any specific influence, it operates either as a means of rectifying the gastro-intestinal circulation and secretion, and relieving these vessels of congestion, or as a gentle but steady purgative. Thus Dr John Hunter informs us, that he found in the obstinate agues of 1788, calomel in doses of two or three grains every night quickly followed by cessation of the disease; and Dr Baillie states, that, in agues in which the bark alone was of no effect, he found the disease gradually give way by combining with it a grain of calomel every night for eight or ten evenings. Little doubt can be entertained that in such cases there is a state of gastro-enteric and hepatic congestion, and that the calomel operates by unloading the vessels of the portal vein. The blue pill may be given with the colocynth, or five grains of the compound powder of scammony, every other night with the same intention. In some instances inunction has been employed with the view of bringing the system completely under the influence of the mineral. But there is no reason to believe that this method can produce any advantage further than may be expected from the blue pill, or calomel, as a gentle purgative and evacuant of the gastro-enteric vessels.

ε. Of all the mineral remedies employed for the cure of ague,

arsenic has been perhaps the one used most commonly, and with the greatest certainty, both in regular and popular practice. Wepfer informs us, that he had received from J. Rudolph Burckhard, Professor at Basil, the description of a most efficacious arsenical febrifuge solution, which was also highly commended by F. Reinhard of Soleure. This, however, he refused to publish, he says, lest he might furnish ignorant or rash practitioners with the means of doing mischief, especially when there were many safer and equally effectual febrifuges. Others, however, were bolder or more reckless. Friccius boasts that he had consumed several drachms of arsenic in practice; Jacobi gives examples of agues removed without any bad consequence by the aid of the mineral, (*Act. Mogunt.* i. p. 216); and Hevermann testifies, that in Alsace so many practitioners used arsenic for the removal of agues that it was almost the only remedy, and that it was also much used at Copenhagen. Rosinus Lentilius also complains in 1709, that several army surgeons, with unjustifiable audacity, had not hesitated to administer arsenic to the soldiers, when labouring under ague; and that, the matter being reported to the College of Ducal Physicians, they were forbidden henceforward, under severe penalties, to exhibit the mineral. (*Eteodromus*, 1709). Notwithstanding these cautions, however, on the part of regular practitioners, preparations of the mineral, in the form of secret remedies, for ague, continued to be vended and used, both on the continent, especially in Germany, and in this country, if we can believe the testimony of Lind; and one, known by the name of the Tasteless Ague Drops, was long in general use in the fenny districts of England. The efficacy of this nostrum had given rise to the suspicion that its basis was arsenic; but the apprehension at the use of a substance known to be so promptly and certainly deleterious, deterred physicians from giving it a trial.

The first regular practitioner who employed the mineral for the cure of ague appears to have been Mr Russell, an army surgeon, who, during the war which was waged in North America from 1754 to 1761, having the charge of an expedition undertaken against the Cherokee Indians, provided himself with a great quantity of pills, containing each the eighth part of a grain of oxide of arsenic, and was by this enabled to

cure the intermittents to which, in that country, the troops were very subject. This was probably about 1756.

Little attention, nevertheless, appears to have been given the subject by regular practitioners till 1781, when, from the celebrity of the Patent Ague Drops, they began not only to be prescribed, but occasionally to be imitated, in Stafford, Birmingham, and other places. Mr Hughes, the apothecary of the Stafford Infirmary, after ascertaining by analysis, that the patent drops contained arsenic, succeeded, in 1783, in producing a medicine, which was followed by similar effects in the cure of ague; and, in consequence of this information, Dr Fowler, the physician to that institution, and Dr Withering of Birmingham, about the same time, began to employ a solution of white oxide of arsenic for the cure of ague, in most instances with very remarkable success.

The preparation used by Dr Fowler was a combination of sixty-four grains oxide of arsenic, and the same quantity of carbonate of soda, dissolved in a pint of distilled water, so that each ounce contained four grains, each drachm half a grain, and twelve drops, the medium dose for an adult, were believed, on the calculation of Dr Fowler, to contain about one-thirteenth of a grain. This dose, or sometimes less, according to the ages and constitutions of the patients, was administered twice or three times daily; and the results were the following. Of 247 cases of agues, 171 were radically cured; forty-five, in which the solution failed, were cured by Peruvian bark; in twenty-four cases the solution was ineffectual, from the irregular attendance of the patients; and seven remained under treatment. In fifty-one cases the fits underwent a temporary suspension; in thirty they were rendered milder or shorter, or both; and in five only they underwent no change, making in total 242, in which the febrifuge effects of the mineral were clearly established. The cases, it may be remarked, were taken without selection or distinction of any kind. More than three-fourths of the patients were under thirty years of age; and the remedy was employed at a period when the disease was prevailing epidemically.

Similar trials were at the same time made by Dr Arnold of Leicester, Dr Withering of Birmingham, and Dr Willan of London. In about eighty cases of quotidians, tertians, and quartans, in which the former physician tried it, he found it

rarely failed; and in some of these, chiefly quartans, in which there was dropsical effusion, it removed at once the ague and the dropsical collection by proving diuretic; in other instances, though few, it required the aid of diuretics. Withering began to prescribe the arsenical solution, consisting of one grain in an ounce of distilled water, for the removal of ague in the autumn of 1784, in doses of twenty-five or thirty drops, three times daily, without regard to the presence or absence of fever; and notwithstanding some complaints of pain in the stomach, loss of appetite, and swelling of the face, the cure was generally effected by about half an ounce of the solution. Of forty-eight cases treated in this manner, thirty-six were cured by the solution alone, three by the solution followed by a little soluble tartar, and twelve received no benefit. Eventually seventy cases of tertian and quartan were treated in this manner at the general hospital at Birmingham, and all recovered without exception. (*Memoirs and Tracts*, ii. 489.) Mr Freer at the same time gave it most extensively and with perfect success. In 1787, Dr Willan of London administered it in forty cases of tertians and quartans, and with almost instantaneous success in all. (*Lond. Med. Jour.* viii. and *Miscell. Works*, p. 460.)

After these trials, the administration of arsenic in the form of solution for the cure of intermittent fever became general among physicians both in this country, on the continent, and in the colonies. In the latter situation it was exhibited by Winterbottom, Blane, Jackson, Irvine, and other naval and military physicians; and its therapeutic powers were tried by Desgranges, Foderé, Bry, and Columbot in France; by Gebel, Heim, and the elder Hildenbrand in Germany; and by Brera and the Hildenbrands in Italy.

The general result of the experience of all these observers on the physiological and therapeutic effects of arsenic in solution, is the following.

The physiological effects of the mineral are to produce sometimes nausea, loss of appetite, or even vomiting and griping pain, with diarrhoea; in other instances, painful and hot swelling of the face and eyelids, or even a tingling eruption, like nettle-rash, on the surface; in some it seemed to produce diuresis. The sickness and griping pains are most conveniently obviated, by combining the solution with opiates, which, indeed, are useful in enabling the practitioner to carry the remedy

to the due length. But if the pain is obstinate, and if the stiffness and redness of the eyelids and face continue, the solution ought to be abandoned.

1. In certain agues, uncomplicated with local inflammation, congestion, or organic changes, the paroxysms may be completely stopped by the exhibition of the arsenical solution, in doses of ten or twelve drops, three times daily, for five days; and the disease may be thereby cured. 2. The forms of ague so curable are not only those in which the morbid process has acquired the habitual character, and is therefore continued by some interruption of the usual properties of the capillary circulation, but those in which the disease has only commenced, and is proceeding regularly to cause visceral congestion. 3. The arsenical solution appears to be more generally successful than bark in suspending fits of ague, since it succeeds in curing cases of ague in which the latter is unavailing. 4. In some instances it is desirable to employ the arsenical solution merely to suspend the course of the ague; and then to employ bark or sulphate of quinine to prevent a relapse. In most instances, after the solution has been exhibited four or five days, it should be omitted, and its place supplied by sulphate of quinine, or some of the vegetable tonics. 5. It does not appear, if properly exhibited, to produce any injurious effects on the economy in those cases in which it has been used to cure ague; and when its direct physiological effects on the alimentary canal and the circulation begin to appear, these may be modified by the exhibition of opium, either in substance or solution, in order to produce curative effects. 6. In cases in which it produces no curative effect, after being exhibited for five successive days, it should be continued three days longer, in the same or augmented doses combined with opium; and if, at the end of this period, it appears either to produce the usual symptoms of arsenical poisoning, indicated by hot swelling and stiffness of the face and eyelids, pain at the stomach, and *tormina*, and slimy diarrhœa, it should be omitted entirely, and opium and sulphate of quinine should be employed to subdue the disease. 7. The arsenical solution appears to operate in curing ague by acting directly on the mucous surface and the capillary vessels of the alimentary canal, and occasionally on the capillary vessels generally.

3. The third object in the treatment of ague, viz. that of

counteracting congestion, inflammation, and other organic changes, has been already in a great degree considered under the other two heads. In short, most of the remedies employed for the alleviation of particular symptoms, especially in the masked, complicated, or accompanied agues, have this effect; and the physician must always remember that the first object is to control local inflammation whenever the symptoms evince its existence.

The diet in the treatment of ague ought to be moderately nutritious without stimulating. Animal food should not be allowed while the tongue is foul, the skin hot, the thirst considerable, and accessions are liable to recur; and the patient should confine himself to food consisting of the boiled or baked farinaceous grains, or arrow-root, sago, boiled rice, or tapioca. Among drinks it is occasionally advantageous to allow wine and water, or even pure wine, at the rate of three or four glasses daily, if there be no symptom of local inflammation. Porter, as a tonic bitter, also answers well, and is often useful in restoring the tone of the stomach. Coffee and cocoa form the best fluids for meals.

The cold bath is often of great use as a general tonic, and was found beneficial by Dr J. Hunter in the agues of Jamaica. It should never be employed, however, unless under the inspection of a physician; since, in cases of visceral congestion or inflammation, it is extremely unsafe, and may be injurious.

Flannel or woollen clothing next the skin is indispensable in all climates.

Exercise, both active and passive, is of great utility. In the ague of North America, Jackson found that sending the soldiers to drill after the paroxysms were suspended, contributed powerfully to convalescence. This, however, implies more strength than most patients convalescent from ague possess; and they are often unable to employ any but gestation of the most passive character. For such subjects horse exercise is useful.

Lastly, the most certain method of effecting the cure of ague and favouring the operation of remedies, is by removing the patient from the sphere of the physical causes of the disease, either by conveying him away from the locality in which he has been attacked, or by raising him above the reach of the insalubrious exhalations.

CHAPTER II.

REMITTENT FEVER.

Febres Continuae Periodicae, Sennerti; *Febres Gastricae*, Bail-
lou; *Febres Continentes*, Morton; *Febres Proportionatae*,
Tozzi; *F. Subintrantes*, Torti; *Fievres Meningo-gastriques*,
Fievres dites Bilieuses of Pinel.

Medical Facts and Experiments, by Francis Home, M. D. Lond. 1759. Part i. sect. 1, 2, and 3, on Remittent Fevers.—An Essay on the Medical Constitution of Great Britain; to which are added, Observations on the Weather and the Diseases which appeared in the period between 1st January 1758 and the summer solstice 1760, by Charles Bisset. Lond. 1762.—Observations on the Diseases of the Army, by Sir John Pringle. Lond. 1764. Chap. iv. on the Fevers called Putrid, Bilious, or Autumnal Remitting and Intermitting of the Army.—A Treatise on the Putrid and Remitting Fen Fever which raged at Bengal in the year 1772. Translated from the Latin of a Dissertation on that subject, by James Lind, M. D. Lond. 1772.—Observations on the Diseases in Long Voyages to Hot Countries, and particularly in those which prevail in the East Indies, by John Clark, formerly Surgeon of the Talbot Indiaman. Lond. 1773.—A Treatise on the Fevers of Jamaica, with some Observations on the Intermitting Fever of America, and an Appendix, &c. by Robert Jackson, M. D. Lond. 1791.—Some Observations on the Bilious Fevers of 1797–98–99, by Richard Pearson, M. D. &c. Birmingham, 1799.—Observations on the Marsh Remittent Fever, more particularly in regard to its appearance and return every autumn, after the Inundation from the Sea on the 1st January 1795, and the five succeeding years at Lynn and its Environs, by Robert Hamilton, M. D. of King's Lynn, &c. &c. Lond. 1801.—An Essay on the Diseases incidental to Europeans in Hot Climates, with the method of preventing their fatal consequences, by James Lind, M. D. &c. Lond. 1808, 6th edition.—A Scientific and Popular View of the Fever of Walcheren and its consequences, as they appeared in the British Troops, &c. &c. by J. B. Davis, M. D. Lond. 1810.—Some Observations upon Diseases, chiefly as they occurred in Sicily, by William Irvine, M. D. &c. London, 1810. Chapter iii. and iv.—History of the Walcheren Remittent, &c. &c. with the Morbid Appearances on Dissection, by Thomas Wright, M. D. &c. &c. Lond. 1811.—Select Dissertations, by Sir Gilbert Blane. Dissert. in Trans. Med. Chir. Lond. iii. Art. i.—Reports, &c. &c. by Sir James Fowell, M. D. Report v. on the Bilious or Autumnal Remitting and Intermitting Fever, called the Walcheren Fever, &c. &c. P. 327.—Observations on the Mediterranean Fever, by Alexander Denmark, M. D. Medico-Chirurgical Transactions, vi. p. 296. 1815.—A Practical Account of the Mediterranean Fever, as it appeared in the Ships and Hospitals of his Majesty's Fleet on that station, with Cases and Dissections, &c. by William Burnet, M. D. Physician of the Fleet. Lond. 1816.—The Influence of Tropical Climates on European Con-

stitutions; to which is added Tropical Hygiene, &c. by James Johnson, M. D. 2d edit. Lond. 1818. — Practical Observations on Fever, Dysentery, and Liver Complaints, as they occur among the European Troops in India, &c. &c. by G. Ballingall, M. D. 1818 and 1823.

§ I.—NOSOLOGY AND SEMEIOGRAPHY.

Remittent fevers have been regarded by many physicians, both practical and systematic, as mere varieties of the intermittent; and this view, which certainly simplifies the subject, is not, perhaps, very remote from the truth. Intermittent fevers, it has been remarked, often become remittent; remittent fevers, on the other hand, not unfrequently are converted into intermittents; and both varieties are found to exist at the same season, in the same places, and to be generated, so far as can be judged, amidst physical circumstances of the same character. The last reason, on which Cullen has laid particular stress in defending his arrangement, * ought not to be admitted to have any weight in proving the alliance of remittent fever with ague; for it does not follow, because two morbid processes arise under the same circumstances, or spring from the same causes, that they are therefore the same; and instances are daily occurring in the history of diseases, in which the same cause or causes, slightly modified, are followed by very different effects. Thus cholera, dysentery, and fever, may arise from the same remote cause, yet cannot be regarded as the same disease.

Independent, however, of this argument, which has considerable weight, I regard the nosological union of ague with remittent fever as not only too speculative for a work which professes to give a mere arrangement of facts, but as not attended with any good practical result, and rather injurious than otherwise to the knowledge of the true phenomena and best treatment of this family of disorders. While, therefore, I by no means deny the interchangeable nature, the identical origin, and the simultaneous existence of ague and remittent fever, I regard it as both more convenient, and more strictly useful, to separate them from each other, and distinguish them according to the type and characteristic train of phenomena which they assume; and I therefore describe in this place the species or varieties of remittent fever.

* Synopsis. Note on Sect. i. INTERMITTENTES. Februm Remittentium, &c.

All Intermitting Fevers manifest a tendency to remit; and observation shows that this tendency is influenced by season, climate, local or meteorological peculiarities, and individual treatment. Cullen, availing himself of this characteristic, formed his first subdivision of individual agues into two sub-genera,—1st, according as they were attended with distinct apyretic intermission, and 2d, as they were attended with remission only. By this arrangement he found a convenient place for the various forms of remittent fever, under the several heads of Remitting Quotidian, Remitting Tertian, and Remitting Quartan. The periods which the paroxysms of the Tertian and Quartan Ague observe, would lead to the inference that the transition to the remitting form would be less direct in them than in the quotidian; but when the modifications which we have already enumerated as incident to the paroxysmal accessions of the tertian and quartan are kept in mind, this transition will be more easily comprehended than it could otherwise be. The history of epidemic agues and of remittent fevers, actually shows that the transition from intermission to remission is least frequent in the quartan, more frequent in the quotidian, and most common in the tertian; and that remitting fevers, under certain circumstances, favourable to disappearance or retreat, not unfrequently are converted into tertian agues.

That an ague be converted into a remitting fever, it is obviously requisite for it to consist of daily paroxysms; and these paroxysms must further succeed each other so closely, as to leave no distinct intermission. Though this may occur in the quartan when tripled, and the quotidian, either legitimate or doubled, the tertian appears to be the ague to which the transition is on this principle most familiar. I have already mentioned a form of tertian ague,—the semitertian of the first order or triple tertian, in which daily paroxysms, two in one day, and one the following, are so arranged, that the apyretic space must be both short and imperfect; and I noticed also another form of this ague, the semitertian of the second order, in which the apyretic spaces are so obscure, that some controversy exists on the hour of accession and the number of paroxysms. This fever is indeed a genuine remittent, for these spaces are never truly apyretic, but mere remissions; and, as I have already stated, the semitertian of

the second order belongs more to the present place than to that of Ague.

It is observed by Torti, that, in the tertian especially of the order now specified, before one paroxysm is completed, another is occasionally commenced; and this form of ague, to which he therefore applied the name of *subintrans*, will constitute a genuine remittent; (*cum unus paroxysmus subintret priusquam prior plane solvatur.*) Torti endeavours, indeed, to draw a distinction between the subintrans ague and the remittent, by the circumstance that the latter is more continuous in course; but it appears, on consideration, impossible to admit this distinction, and that the difference is merely one of degree. "It is commonly noted," says Huxham, "that if the fever from a regular tertian runs into a semitertian or quotidian, or greatly anticipates the time of the regular paroxysm, a remittent or continued fever is forthwith the consequence." P. 22. And again, "But as some intermittents are apt to run up into an inflammatory fever, far the greater number, especially in the autumnal season, are disposed to sink into low irregular remittents, putrid or slow nervous fevers." Ibid. 24.

It appears, therefore, that the manner in which the transition from ague to remittent fever is effected, is chiefly by the former attacking in daily paroxysms instead of their regular periods, and by the paroxysms succeeding each other with unusual rapidity; that though this change in the paroxysmal accession and duration may occur in every form of ague, it is most common in the tertian; and, lastly, that the two varieties of semitertian, but particularly the last, are the forms of ague in which the apyretic space is gradually converted into a remission. I further remark, however, that the admission of this modification into the nosological arrangement of ague, and above all, the circumstance of tertian with remission only, is, to a certain extent, a fundamental error in the nosology of Cullen; and with the same justice, and by the same means, might continued fevers have been united in the same tribe with intermittents. In tracing, therefore, as I have done, the transition from ague to remittent fever, I merely exhibit the course which appears to be often observed in the appearance and formation of the disease; and by no means wish this

transition to be regarded as a proof of the generic or special identity of ague and remittent fever.

Experience shows that remittent fevers occur chiefly during the warmest seasons of the southern countries of the temperate zone, and during the summer or dry season of the tropical regions. The facts, which are known regarding the circumstances under which they take place, show that remittent fevers, as they occur in England, France, Holland, and Germany, differ from those which occur in Spain, Italy, the Mediterranean islands, or in Africa and the East and West Indies, chiefly in characters which show a difference of degree rather than of kind. At the same time, as this difference in degree is often very remarkable, and as it sometimes leads to important variations in treatment, I believe it will not be entirely improper to make it the foundation of the only distinction of remittent fevers which I propose to adopt. According to this principle the varieties of this disease are three; *1st*, the autumnal remittents of temperate countries, as England, France, Germany, Holland, Hungary, &c.; *2d*, the summer and autumnal remittents of warm countries, as Spain, Italy, Greece, the Mediterranean coasts and islands generally, the Levant, the north of Africa and Asia, and the United States; and *3d*, the endemic remittents of hot or tropical countries, as the south of Asia, Central and Western Africa, Equinoctial America, and the West India islands.

Several authors and practical observers have regarded hectic fever, another disease of febrile character incident to the human frame, as a variety of remitting fever. I am induced, however, to abandon this arrangement for two reasons; *1st*, I am satisfied that hectic fever is in no instance a primary or idiopathic disease; and *2d*, in its unformed state, it is not to be regarded as of the remitting, but rather continued form. These points, however, will be more fully considered afterwards.

It has been recently the custom to associate with remittent fever the yellow fever of the West Indies and of North America, and more lately that of Spain. It is to be observed, however, that those who have personally seen the disease are not unanimous in regard to its actual remitting character; and not a few appear to consider it as essentially distinct from the remittents which are endemic in warm and tropical climates. To

avoid this field of controversy, therefore, I shall refrain from associating yellow fever with the present tribe; and, without expressing any opinion as to its origin or peculiar nature, deliver its history in another place.

A. Autumnal Remittent. *Febris Remittens, Febris Biliosa Autumni vel æstiva.* Bilious Fever, Gall-sickness of Netherlands, Walcheren Fever.

The autumnal remitting fever may commence in one of two modes. Either it succeeds to regular ague of the tertian or semitertian form; or it commences immediately as a remittent. In the latter case, which is the only one requiring particular notice, an indistinct sense of languor and feebleness, ascribed to cold, is succeeded by slight and transitory chillness, rarely the distinct shivering of the regular tertian. This chillness or shivering, which varies in violence and duration, and is accompanied with pains of the back and limbs, is succeeded by burning heat of the trunk, epigastric and hypochondriac regions and general cutaneous surface, while the extremities continue cold and uncomfortable. The head aches, the eye is restless and wild, and the face is flushed. The mouth and throat are generally dry and clammy, and the tongue is whitish, but sometimes without remarkable thirst. The pulse is generally quick, small, or contracted, tense, and not unfrequently irregular; the breathing is anxious and hurried; and the muscular strength is much impaired. These symptoms, which continue for several hours, (six or eight), and may be regarded as a hot stage of the fit, are generally attended with sickness and vomiting of slimy, sour, and bad-smelling matter mixed with bile of various shades,—yellow, green, dark-green, or black,—and discharges of similar matters from the bowels.

In the course of a few hours more, gentle but partial sweating comes on, heat diminishes, vomiting and purging are lessened or disappear, the head ceases to ache, the countenance is less flushed, and the pulse becomes slower and softer, and the breathing appears natural; the skin, however, is either dry and harsh, or clammy and imperfectly opened in unctuous sweat; the white of the eyes is more or less yellow; and the patient is giddy, and complains of noise in the ears, and languor, weakness, and general soreness of the limbs. This change of symptoms, which constitutes the remission, takes place about ten, twelve, or

fourteen hours from the first sensation of chillness, and continues about two, three, or four hours. It therefore marks the termination of the first fit or paroxysm of the fever.

About this time, however, that is, twelve, fifteen, or eighteen hours from the first, the individual is again affected with chillness, languor, headach, and sickness, which are in like manner succeeded with the usual train of feverish symptoms,—quick pulse, anxious and panting breathing, epigastric pain, vomiting and copious discharge of bilious matter from the bowels. These discharges of bilious matter are in some cases attended with such weakness and exhaustion of the powers of life, that death may take place in the second paroxysm.

If this event do not take place at this stage of the disease, the paroxysms return with phenomena more obscure, and terminate with remissions less distinct each time. After the first two diurnal revolutions, (forty-eight hours), the fever goes on with symptoms in which the paroxysmal accessions are almost lost, while their exacerbations or temporary aggravation are in general more marked and violent. The head is hot, distended, and aching, the countenance flushed and sometimes turgid, and the eyes glistening and wild, generally with more or less raving; the pulse is quick and sharp, sometimes weak and fluttering, sometimes full and strong; the tongue is covered with a viscid yellow fur; the bilious discharges from the stomach and bowels abate or cease; and the skin is either hot and burning, or bathed in partial clammy sweats, especially about the head and neck, which rather aggravate than relieve the sufferings of the patient. This state of symptoms continues with more or less accuracy from the end of the second to the seventh, ninth, eleventh, or fourteenth days. As the disease approaches to this period, the pain and distension of head increase, with occasional raving (*delirium*), and are finally converted into stupor and insensibility; the yellow fur of the tongue becomes brown or black; starting of the tendons (*subsultus tendinum*), or general spasms or convulsions of the muscular system come on; the pulse becomes weaker and quicker, sometimes irregular, the breathing laborious, and finally languid; and coma generally terminates in death.

This is a general description of remittent fever occurring in England, as described by Hamilton of Lynn, and Pearson of Birmingham; but variations may take place both in the fever

as it takes place here, and as it appears in Holland, Germany, or even Spain and Italy.

Remittent fever varies in symptoms, in duration, and in termination.

It may appear in the form of ague, of the regular tertian period, consisting of the usual fits and intermissions, during which the heat and pulse are natural, and the urine deposits a white flaky sediment. After two or three paroxysms, however, it assumes the usual form, with yellow or brownish furred tongue, profuse sweating, not critical, but symptomatic; heat or pain of head, raving, stupor, coma or convulsions, and death. This form occurred at Lynn Regis.

It may be attended with copious bloody discharges from the stomach (*hæmatemesis*), bowels (*melæna*, *hæmorrhoids symptomatica*), kidneys (*hæmaturia*), and in some instances the uterus in females (*menorrhagia*). Bleeding from the nose (*epistaxis*), is symptomatic of determination to the head, and sometimes relieves the headach, raving, or stupor. These bloody discharges may occur any time in the fever between the fifth and ninth day. The appearance of *petechiæ* is also connected with this train of symptoms. They are red, purple, or brown; and occur in young people without hemorrhages from the mucous surfaces.

The cold stage of the third paroxysm, sometimes of the fourth, may assume the form of a mortal fainting fit, or that of general cramps or spasms of the voluntary muscles, especially of the legs and arms,—of hysterics in women, and epilepsy in children and young persons. (*Pearson*).

When fever continues after the eleventh or fourteenth day, the remissions are always obscure, sometimes imperceptible. The patient is generally deaf, drowsy, or lethargic; the skin is hot, dry, and harsh, or partially moistened; the pulse small and frequent; the tongue covered with a brown thick fur; the bowels are bound, or instead of discharging natural feculent stools, pour out great quantities of dark or bloody fluids. At the same time the belly may be distended, and sore on pressure; and aphthous ulcerations may appear on the mucous membrane of the throat and tongue.

The duration of remittent varies from the period of two diurnal revolutions to five, six, or eight weeks, or even longer.

Remittent fever may terminate in health, in death, or other diseases.

The favourable termination is effected either by critical sweating and urine on the fifth, seventh, ninth, or eleventh days, or by critical diarrhœa of bilious matter before the fifth day, or by gradual and insensible change, or abatement of symptoms, on the seventh, ninth, eleventh, or fourteenth days. In some cases an eruption of vesicles or pustules about the mouth, boils on various parts of the person, or some transfer of morbid action, may take place at the same time.

The termination in death may take place, *1st*, by excessive bilious, serous, or sero-sanguine discharges, with muscular cramps and convulsions in the second paroxysm, or any time between the fifth and ninth days. *2d*, In the cold stage of the third paroxysm, by fainting, asphyxia, or general convulsion. *3d*, In the hot stage of the third paroxysm, or of any subsequent exacerbation by frenzy or apoplexy. *4th*, By general effect of the febrile commotion, but chiefly in consequence of injury to the cerebral functions, any time before the eleventh or fourteenth days. *5th*, After the fourteenth day, by exhaustion of the vital powers, but chiefly with symptoms of suspension of the functions of the brain, and much disorganization in the capillary system, giving rise to petechial spots, hemorrhage from the mucous surfaces, and mortal colliquative sweats.

Remittent fever may terminate in quotidian or tertian ague after five or seven revolutions; in water of the brain in young subjects; in consumption in the predisposed, in peripneumony, in inflammation of the intestines, in dysentery, in nephritis, or in general dropsy, with or without disease of the liver.

This form of remittent fever is endemial in many countries, and appears occasionally in certain districts for several successive autumns. It was seen by Dr Lind in the autumn of 1765 at Portsmouth and its neighbourhood, in the island of Portsea, and even at Chichester; at Lynn *Regis*, and over the greater part of Marshland in 1779, 1780, 1781, 1782, 1783 (Observations, p. 46,) by Dr Hamilton, and at Birmingham in 1797, 1798, 1799 (Observations, 1,) by Dr Pearson.

In countries where it is endemial, strangers, or those not accustomed to the air and climate, are generally attacked more readily than natives, and with certain peculiarities which it is requisite to notice.

Without previous disorder, or after short and slight

chilliness, it commences at once with violent headach, burning heat, intense thirst, pain of the back and loins, aching and soreness of the bones, and great weariness and restlessness, (*inquietudo*.) Painful oppression at the pit of the stomach, squeamishness, sickness, and retching, follow, terminating either in vomiting of bile, or evacuations of bilious matter from the bowels, with much *tenesmus*, griping, and pain. (Pringle, 65, 176, and 181). The pulse is said at first to be small, and not quicker than natural, but to rise after bleeding. (Pringle, 65, 176, and 181). It is probable that it merely rises in the course of the disease. The headach is sometimes accompanied with furious raving, which abates as remission comes on. (Pringle, 65, 176, and 181). The duration of the paroxysm appears to be about six or seven hours, but with variations according to the length of the hot stage, and degree of sweating; but when distinct, it appears at the same hour the following day. (Stedman *apud* Pringle). In general, the paroxysms of which this fever consist undergo remission; but in the more severe cases, and as the disease advances, it assumes a continuous or unremitting form. (Stedman *apud* Pringle). In mild cases, and when about to disappear, intermissions take place. In others, again, a reverse course is observed; the fever being at first continuous, afterwards remitting slightly, and finally remitting evidently, (Lauder *apud* Pringle, 185), or undergoing complete intermission.

This form of remittent is common in Dutch Brabant, and is said by Sir J. Pringle to be the most severe (p. 180) and dangerous. Though endemial in the whole of this district, it is more frequent near the banks of the Scheldt, the Meuse, along the sea coast, and especially in the islands of South Beveland and Walcheren. Its ravages among the British troops in 1809 at these places rendered it familiar under the name of Walcheren fever, both to the profession and to the public at large, and revived among physicians that knowledge of its history which the researches of Pringle had communicated, but which had been forgotten since the time when our troops ceased to campaign in the Netherlands. It is, nevertheless, singular that no descriptions, so far as we know, have been published by physicians who observed the disease in the country; and the three works to which I have referred above were formed from the cases which were sent to Colchester or Harwich

on returning to this country. I do not wish by this to insinuate that the remittent fever of Walcheren in the persons of those who have quitted the unhealthy country differs from that which is observed in those who continue in it; but merely as a circumstance which should be known to those who study it in the monographical writings. The peculiarities of this disease, which depend on the characters of the countries in which they prevail, shall be more fully illustrated afterwards.

B. Bilious Remittent of Spain, Italy, the Mediterranean coasts and islands, and the Archipelago; Summer and Autumnal Fever of the Levant, (Irvine); Mediterranean Fever, (Burnett and Denmark); *Hagymaz* or Hungarian Sickness.

Remittent fever has been from the remotest periods known to prevail along the coasts, and on the islands of the Mediterranean; and there is little doubt that the experience of Hippocrates, and many of the Greek and Roman physicians, was chiefly derived from the phenomena of this disease.

In modern times, our military and naval operations during the late war rendered us unusually familiar with this disease; and while most of the crews of the Mediterranean fleet were annually attacked by it, in more or less severity, it became of the utmost importance to recognize its presence, and conduct its treatment, so as to prevent its fatal termination.

The fever so common in the Mediterranean, rarely begins to prevail generally till the close of June or the beginning of July, when slight attacks of it appear in the form of more or less intense headach, suffusion and redness of the eyes, flushed face, hot or variable skin, squeamishness, sickness, and impaired appetite, loss of strength, strong quick pulse, from 110 to 120, and more or less thirst. These symptoms sometimes, under favourable circumstances, as in young vigorous subjects, or after free purging, rest, and low diet, subside spontaneously in sweating, or an eruption of vesicles round the lips.

In more severe and well-marked cases, it is not uncommon for individuals to be attacked suddenly, and without any warning; soldiers, for instance, on duty, as centinels, or seamen in the course of hard duty on survey, are suddenly attacked with intense pain of the head, followed by great weakness and a sense of general lassitude and bruising pain all over the body and limbs.

In other instances, however, the patient feels a sort of weariness and lassitude, with occasional shivering or chills, alternating with heat and flushes, with much weakness and loss of appetite, gradually but irresistibly stealing upon him.

In whatever mode the disease commences, when established its leading symptoms are the following. With headach more or less intense, sometimes amounting to violent throbbing; constriction of the head; giddiness; suffusion, muddiness, and redness of the eyes; flushing or dull red colour of the face; the pulse tense and quick, from 110 to 120, sometimes small and oppressed; the skin is hot, dry, and imperspirable; the appetite is gone; the tongue more or less furred; thirst very intense; the bowels are bound; the epigastric region is more or less tender; the urine scanty and high-coloured; and the patient is completely sleepless and restless.

As the disease proceeds, the symptoms of head affection increase in intensity. The patient complains much of the constriction and painful throbbing of the head, and occasionally of pain over the orbits, sometimes amounting to intolerance of light. The temporal arteries are much distended, and throb violently. Thirst, quick pulse, epigastric tenderness, and restlessness, continue. The surface continues hot and pungent, and, with the sleeplessness, adds much to the anxiety of the patient. These symptoms continue till the close of the second, or beginning of the third, day of the disease, and constitute what Irvine calls the *first* or febrile stage of the disorder.

On the third day they appear to be less violent. The patient complains less of headach, thirst, and heat, and is less anxious and restless, for some time varying in duration.

But this apparent calm is insidious and temporary. The patient is somewhat stupid and listless; the colour of his face is less intensely red, but presents occasional flushings, and is passing to a sort of dingy lurid hue, with a slight yellow tint; and the eye may be observed to be watery, muddy, and dull, and the *conjunctiva* slightly yellow. The pulse continues nearly at the same rate as to number, being about 110 or 120 in the minute, but is softer and less tense; the heat and thirst are less distressing; but the skin is dry, and presents a pungent sensation of heat, or is partially moistened by a clammy unctuous sweat. The tongue is covered with a viscid whitish yellow fur, and the patient generally complains that every thing

tastes bitter, or that he cannot taste any article, whatever be its qualities. These symptoms denote the slight remission in the febrile process, which takes place after the fit of what represents the doubled tertian. It constitutes the stage of interval or remission of Irvine.

Towards the evening of the third day, or during the night between that and the fourth, sometimes on the fifth, the symptoms either become entirely more moderate, or they assume a new and more violent character. The epigastric region becomes more tender and painful, with much tension and oppression of the hypochondres; and after some squeamishness and sickness, retching and vomiting ensue. The belly generally also becomes painful, and more or less tense and tympanitic; and frequent discharges of fluid, black, occasionally gelatinous stools take place, sometimes inodorous, sometimes with a peculiar mawkish fleshy sort of smell, and which, if kept, undergo the putrefactive decomposition of animal matters. The countenance becomes deeper and more dingy in colour, till it is almost brassy or orange like; the eye is dull and watery, and the *conjunctiva* yellow. The pulse is quick and small, sometimes intermitting, and occasionally variable; the skin partially moistened with unctuous sweats; the tongue is covered with a fur, which is now thick and viscid; and the thirst is less intense, because the patient is less sensible to his own sensations, and to external objects. He in general lies in a semi-stupid state, listless, and indifferent to surrounding objects, is a little incoherent in speech, and wandering in thought, but when spoken to, he can nevertheless answer questions rationally.

In a space of time varying in different cases from six or eight hours to twenty or twenty-four, these symptoms, which are constantly increasing, become converted into constant burning anguish at stomach, with frequent vomiting, in which, at length, blood and dark-coloured fluids like coffee grounds are rejected. Blood flows from all the mucous surfaces; starting of the tendons, and picking of the bed-clothes supervene; and the patient, who is now constantly muttering incoherently and indistinctly, falls into a state of coma, or dies convulsed.

In some instances coma supervenes more suddenly, while the vomiting and bloody discharges become less frequent, or seem to stop entirely. This corresponds to the comatose or apoplectic stage of Irvine.

The fatal event may take place in this fever on the third,

fourth, or fifth day, but generally from the fifth to the eighth. In less severe cases life has been protracted to the fourteenth, eighteenth, and twentieth; and Irvine mentions that he lost one patient so late as the thirty-fourth day.

The process of this fever, though bearing a general resemblance to what is now described, is liable to very considerable variations. Perhaps the most striking circumstance is that of slight remission about the third day. But this is admitted both by Irvine and Burnett to be by no means the usual character; for in many instances no remission, but a slight amelioration of symptoms only appears; and the fever proceeds in a continuous course with evening exacerbations, but without distinct remission in the morning to its termination either in health or death.

The symptoms and fatality of the disease vary according to the season. In the summer months of June and July, while the surface of the earth is still dry, and the solar heat intense, the fever exhibits chiefly symptoms of affection of the brain and its membranes, indicated by intense headach, delirium, and strong tense frequent pulse, terminating in coma, with less of the gastro-enteric affection. In the month of August, however, after the rains have fallen, and the surface has become moistened, the gastro-enteric symptoms become more frequent and prominent, yet without sensible diminution of the encephalomeningeal affection. In some instances the fever becomes at this season complicated with symptoms of diarrhœa, dysentery, or cholera.

The circumstances which indicate a favourable termination, are abated intensity of the headach and pain of the orbits, the eyes becoming clearer and less suffused, the countenance becoming clear and pale, the pulse abating in frequency, with general moisture of the skin, abatement of thirst, and abatement or total subsidence of the pain of the epigastric region and sickness. It is always a favourable circumstance, also, when the bowels are readily acted on by medicine, and the patient continues to void his urine. If, on the contrary, the bowels, instead of discharging feculent matter, emit only thin, dark, slimy fluids, inodorous or mawkish, if the patient continues listless and semi-stupid, with frequent hiccup and vomiting, and if the urine is either not secreted by the kidneys, or is not expelled from the bladder, these symptoms indicate a deep and

intense affection of the vascular system of the brain and gastro-enteric organs, and of the capillary system generally.

I refer to this head the disease denominated *Hagymaz*, *Tsomor*, and Hungarian sickness, (*Languor Pannonicus*, *Lues Hungarica*; *Febris Castrensis Hungarica*; *Amphimerina Hungarica*; Sauvages) which has been long known to be endemial in that country, and to prevail epidemically whenever any of the forces of the European powers were marching through it, or stationed in it, for the purposes of warfare. From the testimony of Ruland, Sennert, Cober, May and Kopff, Alberti and Schuller, Benkotzi, Gomory, and Baty, as well as more recent observers, there is no doubt that it approaches in the same manner, with feebleness, lassitude, and wandering sensations of chilliness, that its established presence is indicated by most intense and oppressive headach, and pain of the orbits, accompanied with epigastric tenderness, squeamishness and sickness, and extreme anxiety and restlessness, and that both these orders of symptoms pass into delirium and coma, and vomiting and hemorrhagic discharges from the mucous surfaces,—all in the space of from three or four to five or eight days.

The rending and burning headach with delirium of the *Hagymaz* is indeed so conspicuous and constant a symptom, that the disease has been ordinarily denominated from this circumstance,—*the Ardent Head Sickness*, (*Der hitzigen Kopf oder Haupt-Krankheit*), *the Head-ill*, (*das Kopff-Wehe*), and the *Brain-tumult*, (*des Hirn Tobens*). Yet the extreme restlessness and anxiety, with the pain at the epigastric region, (*anxietas circa præcordia*, *Hertz-Angst*), and the constant sickness and vomiting, have been not less remarked by all the authors who have described the disease. Without manifesting very distinct remissions, the Hungarian sickness has always presented evening exacerbations, in which the headach and delirium were increased, the patient became more restless, the respiration more rapid and anxious, and a sleepless night was followed by a state of languor and feebleness on the following day. Then ensue severe vomiting of every thing drank, afterwards of dark-coloured fluids, oozing of blood or bloody fluids from all the mucous surfaces, and especially the intestinal, petechiæ on the skin, starting of the tendons, coma, muttering, and death.

The disease was believed by Ruland, May and Kopff, and Alberti and Schuller, to be contagious. But it is evident that

this was a most erroneous notion: and that it was simply the endemic of the country operating with peculiar force and energy during the summer and autumnal season on the constitutions of persons coming in great multitudes from drier and more salubrious regions.

It is stated by various authors, and repeated by Lind, that the European nations, in proceeding through Hungary during the crusades, lost more than half their number by this sickness. But the era when the attention of European physicians appears to have been first forcibly attracted to the Hungarian fever, was in 1572, when the Emperor Maximilian II., in an expedition against the Sultan Solyman, led a numerous force to Komora, on the small island of that name in the Danube; and when the greater part sickened and were destroyed by this disease in the course of a few weeks. After this period, the insalubrity of Hungary became notorious; and the experience of two centuries and a-half has only confirmed the general conclusion, that it is essentially and naturally a country extremely productive of remittent fever, and that to strangers visiting it in large and numerous bodies, it is invariably the cause of much sickness and mortality.

The circumstances on which this insalubrity depends, shall be considered elsewhere,

C. Tropical Remittent; *Puka* or *Pukka* Fever of the East Indies; Jungle Fever; Hill Fever of the East Indies; Bilious Remittent of the West Indies and Mediterranean; Remittent of North America; Bulam Fever; Sierra Leone Fever; Fever of Fernando Po and Bight of Benin.

The best example of the tropical remittent is to be found in the fever of Hindostan and other parts of the East, as it is described by Lind, Clarke, Johnson, and some other authors, or that of Africa by Schotte, Winterbottom, and Boyle.

According to the first author, the East India fever approaches with a sense of languor and feebleness, pain and weight of the head, or giddiness, and bruising pain of the loins, followed by slight chillness, alternating with irregular sensations of heat, which after some time become more intense and permanent, until general heat is established all over the body, with intense head-ach, injected ferrety eyes, and much epigastric pain, thirst, and squeamishness, followed by sickness and vomiting. In the

course of twenty-four or thirty hours the fever is said to remit, when the pulse returns almost to its natural standard, the heat becomes less intense, and the skin is moistened with partial sweats; but the pain of the head and loins continues, and the patient is still squeamish, sick, and complains of epigastric pain.

This remission may be followed by another paroxysm, during which the headach, with delirium, burning pain at the pit of the stomach, anxiety, incessant thirst, squeamishness, sickness and vomiting, or copious loose stools, are the prominent signs. The matters vomited and discharged by stool are said at this period to resemble chalk and water, or broken curdled milk and whey. The fur on the tongue becomes thick, dry, yellow, and brown; and the lips and teeth are covered by a black or brown viscid crust (*sordes*). Another remission ensues, marked by partial sweating, and slight abatement of heat. This is followed by a third paroxysm, in which the pulse becomes excessively quick and small, and *typhomania* or *coma*, with picking of the bed-clothes, and muttering inarticulately, very speedily destroys the patient.

This description, which is derived from the Bengal fever of 1762, is on the whole very faithful to the phenomena. It is said, however, by recent authorities, that the description of Dr Clarke, derived from the Bengal fever of 1768, (Clarke, 124), is in some respects more complete, and communicates a more accurate notion of the exquisite or perfect form of tropical remittent than any hitherto published. This author represents the disease as of two varieties;—*α*. as it appears at sea, or in favourable land situations; *β*. as it prevails in low, woody, unventilated countries, where the heat is intense, the moisture great, and the surface marshy.

α. The first variety commences with lassitude, shivering (*rigor*), or sometimes only chilness, and pains of the back and bones. These symptoms are succeeded by sickness at stomach, great heat, thirst, and pains above the eyebrows. The pulse, though soft, becomes very quick and full; the countenance is flushed; the head aches violently; the patient is troubled with great restlessness, anxiety, and oppression; and in the height of the paroxysm vomits abundance of bile. The fit generally terminates in sweating, and the patient enjoys a short interval of tranquillity, during which the pulse seldom returns to its natural state; and almost all complain of a bitter taste in the

mouth, giddiness, headach, and loss of strength. In a few hours the return of the feverish accession is known by an aggravation of all the symptoms, and terminates, as before, in sweating, or sometimes by a copious discharge of bilious matter from the intestines.

If the disease is neglected, the remissions grow more indistinct, and sooner or later pass into the continued form, accompanied with many of the following symptoms. The tongue, which before was only white and furred, becomes dry and black; the teeth and lips are covered with a viscid slime; and aphthous spots sometimes appear in the mouth and throat. The heat, headach, and restlessness are aggravated; the eyes either become dull and heavy, or wild and staring; and the patient falls into coma or raving, attending with tremors and startings of the sinews (*subsultus tendinum*). As the disease advances, the strength sinks, the pulse becomes small and fluttering, and the heat of the skin is changed into cold clammy moisture. At the same time dark-coloured spots (*vibices*), and petechial marks appear on the skin; bloody discharges issue from the nostrils, mouth, and intestinal surfaces; and life is terminated either in convulsions or general exhaustion.

In some instances, instead of the paroxysms as above described, the patient is at first merely indisposed, with giddiness, headach, and low spirits, and though able to go about, is always worse at night. When the fever commences in this form, in general the danger is greater, the remissions are less distinct, and the symptoms of disorganization of the capillary vessels are more obvious.

This is the form in which the tropical remittent appears among European sailors on shipboard, sometimes at sea, or, as frequently happens, in sailing up the Ganges, or at land in favourable situations. It appears to be the endemic of India in its mildest form, and prevails not only at Bengal, and along the banks of the Ganges, as represented by Lind and Clark, but at Madras, Goa, and along the greater part of the coast of Coromandel.

6. The second variety of this disease, which is distinguished by greater severity, and more general fatality, was prevalent in Bengal in 1768, and furnished Dr Clark with the following description. It attacks in various ways, but commonly

with shivering (*rigor*), headach, pain and sickness at stomach, oppression of the epigastric region (*præcordia*), and great dejection of spirits. Sometimes without previous indisposition, individuals fall down in a fainting fit, during the continuance of which the countenance is pale and gloomy. As they begin to recover their senses, they express the pain they suffer by applying their hands to the head or pit of the stomach; and after vomiting a considerable quantity of bile, they soon return to their senses. In other instances, the suddenness of the attack is attended with such excruciating pain at stomach, and so great timidity and faintness, that an immediate opiate has been thought necessary.

In whatever mode the disease commences, the pulse is small, feeble, and quick, the pain of the epigastric region increases, and the vomiting continues. As the paroxysm advances, the countenance becomes flushed, the eyes red, and the headach exceedingly violent,—while the tongue is furred, the thirst is intense, and the pulse is very full, and in general sharp. These are soon accompanied with raving, (*delirium*), during which the patients are very unmanageable; but in the course of twelve or thirteen hours, profuse sweating generally mitigates all the symptoms. During remission, the pulse, which before is generally about 130, falls to 90; and the patient returns to his senses, but complains of great debility, sickness at stomach, and a bitter taste in the mouth. This space, (interval, remission), which is very short, is succeeded by another fit, in which all the former symptoms are much aggravated, especially the thirst, *delirium*, pain at stomach, and vomiting of bile. The breath and sweat even begin to be offensive.

If the disease is neglected in the beginning, the remissions totally disappear, and the symptoms observe an uninterrupted course, which is distinguished only by occasional exacerbations, generally about the latter part of the day. The pulse becomes small and irregular, the skin moist and clammy, the tongue more black and crusted, and the epigastric pain and vomiting of bile are more violent.

In this state all the excretions, but especially the stools, are very offensive, and run off involuntarily; delirium is converted into *coma*, with occasional raving (*typhomania*); starting of the sinews (*subsultus tendinum*) tremors and hiccup are added; the extremities grow cold, and are covered with livid

po ts (*vibices*) ; and the body, for several hours before death, not unfrequently emits a cadaverous smell.

Dr Clark, though he admits the same changes in the urine as Dr Lind, observes, however, that the physician cannot place much reliance on them in the fevers of warm climates.

This fever may terminate fatally in the first paroxysm, in the third paroxysm, or at any time between the third and seventh day. When it terminates in the first paroxysm, it is generally attended with furious delirium, ending in mortal coma. When beyond the third day, it more generally terminates either in convulsions, or mortal fainting, with bloody discharges from the mucous surfaces. If it continue beyond the seventh day, it may go on to the fifteenth or twentieth ; but after this period, it is said to terminate either in *hepatitis* or dysentery, which then complete what the fever had failed to accomplish.

In some cases death is preceded by yellowness of the skin, and vomiting of dark-coloured matters.

This nosographical history, the accuracy of which has been confirmed by the observations of Marshall, Johnson, Ballingall, and many other observers, corresponds not only to the most severe and exquisite form of remittent fever, as it occurs epidemically in Bengal, but also to all the more severe forms of fever in the tropical regions of the East. It is, with very trifling differences, the fever of Coimbatore, of Guzzerat, of Bombay and the Coromandel coast, of Batavia, Edam, and Java. It is common in the Mysore ; and has been so prevalent and fatal at Seringapatam, where it is generally attended with yellowness and black-vomiting, that it has been distinguished by the name of *Seringapatam* fever. At Bassorah on the Euphrates, and at Gambroon on the Persian Gulf, it appears annually, and some years rages like a pestilence. It is, in short, the proper fever of the country, and, under certain circumstances, may prevail as an epidemic, with great and irresistible mortality.

This disease is not, however, confined to the eastern regions of the tropics, or even to the intertropical countries, but prevails in various degrees, and in different forms, during the hot and autumnal months of all parts of the globe, where the summer heat continues to operate sufficiently long. Thus it is endemial along the whole western coast of Africa, from the mouths of the Senegal and Rio Grande to those of the Niger in the Bight of Benin. In the southern divisions of the United States, also, especially along the basins of the Ohio, Missouri, and Mis-

issippi, in the greater part of North and South Carolina, Virginia, Maryland, Louisiana, and Florida, this fever prevails wherever there are inhabitants, especially if newly arrived from Europe, and if not seasoned or acclimated to the country. It is unnecessary, however, to describe the characters of these autumnal or tropical remittents of individual countries; and I trust, that the descriptions already given will communicate a pretty correct idea of these fevers, either in their mildest or their most severe forms.

§. II.—ETIOLOGY OF REMITTENT FEVER.

Regarding the causes of remittent fever various opinions have been promulgated. It is in general observed to prevail in the same situations in which agues are abundant; and, with the conditions already specified, there is no doubt that the same physical causes concerned in the production of ague are also adequate to give rise to remittent fever. In explaining the origin of this disease, however, the observation already made regarding the inessentiality of marsh, and marsh exhalation, properly so named, becomes infinitely more forcible. No fact appears to be now better ascertained than that remittents, though often originating in marshy situations, may arise, nevertheless, and prevail with great severity, where no marsh is visible. In the rocky islands of the Mediterranean, for instance, Minorca, Sardinia, Sicily, Cephalonia, Zante, and most of the Cyclades, and in all the rocky coasts of that sea, especially at the mouths of rivers, remittent fevers passing into continuous are under the various denominations of burning fever, summer fever, autumnal fever, the perennial and endemic disease of the country. I am satisfied, also, from numerous passages of the classics, that this disease was the annual visitant of Rome and the large towns of Italy in the months of July and August, and often prevailed to such an extent, and with such virulence, as to carry dismay and mourning into the bosoms of whole families. It was at such seasons regarded unsafe to reside in Rome, or to visit the capital; and Horace, in his Seventh Epistle of Book i. excuses himself from visiting Mæcenæ, in apprehension of being attacked by the summer fever. By the testimony of Townsend, Willaume, Fergusson, Proudfoot, and Jackson, remittents are equally general and constant during the summer and autumn in the driest parts of Andalusia and the Sierra Morena, in Spain, especially along its

southern coast ; and, while they are associated on the one hand with agues, they are accompanied on the other with continuous fevers.

In all these situations these fevers, it has been shown, depend not so much on the presence of marsh exhalation, or *malaria*, properly so named, as on the intense and enduring solar heat causing the process of terrestrial desiccation to advance with great rapidity, and proceed to an extreme degree. It is, doubtless, in this manner that these fevers prevail in the South of Spain, at Gibraltar, Carthagená, in the *fiumari* of Sicily, as already noticed, and in those of all the dry rocky islands of the Mediterranean. Nor is it otherwise with the West India Islands, in which they are also endemial and perennial, in many situations in which marshes cannot be recognized, and in which, however, the solar heat operates most intensely, with little or no wind on the dry or drying surface.

On shipboard in the Mediterranean, in the East Indies, in the West Indies, and on the coast of Africa, they prevail chiefly when the vessels arrive from a long voyage, and approach the land, or come into port. Thus it was chiefly when the vessels came into, or were stationed in, Mahon harbour, that their crews were attacked with remittent fever in the years 1811 and 1812. It is principally when the vessels arrive after a cruise off the Senegal, Rio Grande, or Gambia, that their crews are attacked ; and as soon as they put to sea, it begins to subside. Similar facts have been observed on the origin of the remittent of the East and West Indies, that of Rangoon, and other places on the Irrawaddy and Ganges.

From these facts, it may be inferred that there is in the emanations of the land something which operates powerfully in inducing remittent fever during the summer and autumnal months,—that it is of the nature of a gaseous emanation, capable of being wafted some distance by means of the land winds,—and that, whatever it be, it operates only in the summer and autumnal months, from June to September inclusive.

There is, however, a certain state of the human frame, which renders it more than usually susceptible to this disease. Europeans, and those from the colder countries of America, are much more frequently, and more violently, attacked with remittent fever in warm and tropical climates than the natives of these countries ; and both in the Mediterranean, along the coast of Africa, in the East Indies, in the West India islands,

and in the Southern States of the Union, newly arrived Europeans are almost invariably attacked, and suffer much more severely from the fever than those who have been long in the country. In like manner, those who, after residing in a febriferous territory, have been out of it for some time, betray on their return the same augmented susceptibility to attacks.

Independent, however, of this state of the constitution, which may be ascribed to some change in the tone of the vascular system, various other causes may predispose to attacks. Of this kind are laborious or fatiguing duty in military or naval operations, labouring in the sun, excess in eating or drinking, much occupation of any kind that fatigues the body and affects the mind, and, in short, every cause which, by excessive action, exhausts the powers of mind and body. One of the most frequent causes of fever among the Romans, in the Augustan age, appears to have been extreme assiduity in the duty of solicitation, and the constant exertion of body and solicitude of mind required in attendance on the courts of law.*

Though the disease prevails annually in most of the southern countries of Europe, and within the tropics, it is liable to acquire, in certain seasons, and under certain combinations of weather, peculiar virulence, and to prevail very comprehensively among a population. In very dry summers, where the winds are light and unfrequent, and the atmosphere calm and undisturbed, remittent fevers are more frequent in occurrence, more rapid in progress, and more violent in symptoms. It is for this reason that the disease, though endemial in all the southern countries of Europe, Asia, and America, and especially within the tropics, displays peculiar violence whenever the natives of colder or more temperate climates are accumulated in numbers in these countries. Europeans in such situations are attacked very readily, and often fall victims in great numbers.

The appearance of remittent fever, indeed, presents two very remarkable circumstances, which merit particular notice in explaining its origin. The one is, that in certain warm or tropical countries, it is much more prevalent than in others; and the other is, that in countries in which it is endemial, it presents, in certain cycles or periods, an unusual and extraordinary degree of prevalence and fatality.

* *Officiosaque sedulitas et opella forensis*

Adducit febres et testamenta resignat.—Horat. Epist. i. 7.

On the first point I have to observe, that though remittent fever may be regarded as the natural product of the soil or atmosphere, or both, in certain countries, it is infinitely more prevalent in some than in others. Thus remittent fever, which in ancient times appeared only in certain years and places in Italy, is now almost a perennial disorder in the Maremma, the Roman territory, and the greater part of the south of Italy. Certain tracts in the East Indies, also, as the Delta of the Ganges, and the low woody maritime tracts called the Sunderbunds, are peculiarly productive of this fever. But of all the places in the Old World in which severe and unmanageable remittent fever prevails most constantly, the western coast and central region of Africa is certainly the most dreadful. From the united testimony of Lind, Schotte, Winterbottom, Beaver, Park, Tuckey, Clapperton and Denham, and Boyle, it is certain that this disease is the annual visitant along the whole of that coast, at the mouths and on the banks of the rivers, and attacks, and almost invariably destroys, all Europeans exposed to it. Independent of the frequent annual sickness and mortality of Sierra Leone, we may adduce in proof of this Captain Beaver's account of the colonization of Bulam, and the history of the two expeditions of Park, and of that of Captain Tuckey up the Zaire, in which the crew fell successively and simultaneously under the virulence of this disease. The prevalence and fatality of these fevers appear in such situations to be little influenced by the kind of season or weather; for, with the exception of the dry season, which corresponds to the winter of extratropical countries, remittent appears to prevail almost the whole year. It attacks, indeed, always much greater numbers after the first rains and between the first and second, and presents greater severity of symptom than at other times; and it is only after the whole surface is covered with water that it begins to cease.

A very similar situation to Western Africa in the New World is the Mosquito shore, and the whole of the coast of the Gulf of Florida, including the mouths of the Rio Negro, Mississippi, and other rivers; and in these places remittent prevails almost incessantly, with great violence and fatality.

Independent, however, of this annual prevalence of remittent fever, there are certain seasons when it rages in situations where it is endemic, with such unrivalled violence and among so great numbers, that it assumes the character, and popularly

obtains the name of a pestilence. On the exact causes of these epidemic visitations we possess little certain information. But in all the instances in which it has been known to display this epidemic and pestilential character, it has been preceded and accompanied by a peculiar train of weather. In some instances it has been traced to extensive inundations of the sea, or of rivers, or of lakes. In other instances it has been ascribed to weather peculiarly dry, and a calm, undisturbed, and windless state of the atmosphere. Thus the various pestilences represented by Livy and Dionysius Halicarnasseus to have prevailed in ancient Rome and other districts in Italy, are ascribed to inundations of the Tiber or Po, or some other river; and, on the contrary, the pestilence of Athens, which was manifestly a remittent fever, was ascribed to a very dry hot season, and to a calm windless state of the atmosphere. In modern Rome, according to the testimony of Baglivi, Lancisi, and Bailly, and in Modena, according to those of Torti and Ramazzini, we find the epidemic prevalence of remittents preceded or accompanied by similar circumstances. In the summer of 1780, a violent remittent prevailed at Bassora, so general in its attacks, and so fatal in its effects, that it destroyed 25,000 persons, and was called a plague; and this was manifestly owing to an inundation of the Euphrates, which, after moistening a great extent of the banks of the river, was speedily followed by intense solar desiccation, during which the fever appeared. The bilious remittents of Senegal described by Schotte, and those of Sierra Leone described by Winterbottom and Boyle, appeared under similar circumstances; and it is observed in the West Indies and the United States, that remittent fevers are unusually prevalent after weather of the kind now specified.

There is still another reason for the cyclical or periodical prevalence of these fevers in countries in which they are endemic. When a remittent fever has, under certain concurrent circumstances of weather, season, and physical peculiarities, made its appearance in any locality, it necessarily attacks all those who are by constitution, habit, and age, susceptible and predisposed; and the majority of these, especially if enfeebled by previous dynamic or organic disease, it destroys. The population, therefore, which outlives such an epidemic visitation, are no longer equally susceptible, and are greatly less likely to be attacked the ensuing season, unless it is more febrile than the past, which, though sometimes, is not generally

the case. The effect of this, therefore, is, that while the epidemic disease continues for a season to attack and destroy its *ordinary* annual proportion of the population, it does not for several years attack the *extraordinary* proportion, because that proportion is not yet ready for, or susceptible of, its attacks.

In the course of a few seasons, however, during which the young have grown up and become adult, the adult have become careless, and perhaps irregular and incautious by long immunity, and their constitutions have become less able to resist deleterious or morbid impressions, and the whole population of the place has become generally augmented by the arrival of persons from various other countries, a considerable number of susceptible persons is gradually formed; and at the end of five or six years, a place of 25,000 or 30,000 inhabitants becomes augmented perhaps by an additional fifth, or even by a third. The majority, or the totality of these persons, are all more or less predisposed and susceptible; a season of excessive drought ensues, in which solar desiccation and little wind form conspicuous characters; fever appears, and spreads at first slowly and gradually, but afterwards springing up in many points, rapidly coalesces; and in a short time is so general and fatal, that it assumes an epidemic character. The usual mortality in the meantime takes place; all the susceptible and predisposed subjects pass through the disease or are cut off; and the population of the place is once more reduced to its state of epidemic insusceptibility and endemic or ordinary liability. This is the usual course of epidemics of remittent fevers in all countries within the tropics, and, indeed, within the 45° north and south latitude.

I have already remarked, that though remittent fever is observed to prevail in the neighbourhood of marshy soil, it is by no means always to be traced to the presence of such a cause. Not only is it often unconnected with marshy or wet ground, but in many situations it appears to be the result of mere intense and long-continued solar heat; and in many warm and tropical countries, especially, the most severe and fatal remittent becomes epidemic during the long prevalence of intense heat and drought. Remittent fever in that case becomes more an atmospherical than a terrestrial disease; and there is strong reason to believe, that it then passes by insensible degrees into the violent and rapid form of fever denominated Yellow Fever or Black Vomit. It has been at least admitted by the ablest

observers, that it is impossible to draw any distinction between the ordinary cases of fever during the prevalence of yellow fever epidemics, and the exquisite cases of remittent prevalent in the Mediterranean, on the western coast of Central Africa, and in the East Indies; and it is consequently inferred that they are of the same character, and differ in degree only. This point, however, shall be considered elsewhere.

Connected with this subject I may refer to another,—the question, viz. of the propagation of remittent from one person to another, or its contagiousness. Although ague and remittent fever were allowed by Meibomius, Lanzoni, Hevermann, Hoffmann, Cleghorn, Senac, and even Clark of Newcastle, to possess such a property when prevailing epidemically, neither of these diseases have for a long period been believed to spread in this manner; and it has been admitted by all the ablest observers, that both are the direct result of the operation of physical agents. Schotte, however, I must add, denominates the remittent of Senegal in 1766, 1775, and 1778, contagious; and Dr Denmark expresses his belief of the communicable character of Mediterranean fever, in consequence of the greater prevalence of the disease on board ships employed to convey prisoners of war from Marseilles to England. (Med.-Chir. Trans. vi. 302.) The number of successive attacks in such cases, I conceive, proves nothing but the universal operation of the cause, and the different degrees of susceptibility of different individuals; and we may still, so far as such examples are concerned, regard remittent fever as endemic, and occasionally epidemic, but never contagious. It has been further imagined, that the great distinction between remittent and yellow fever is, that the latter is contagious, and the former void of this property. This distinction, however, is not a good one; and it is rather a strong example of the impropriety of reasoning in a circle, and assuming one part of a question in order to prove another. It is here assumed either that yellow fever is contagious, in order to prove that it is different from remittent, or that it is different from remittent, in order to maintain its contagiousness. This argument, I have no hesitation in saying, is most fallacious; and, if yellow fever is to be proved to be contagious, it must be shown to possess this property on the ground of the facts connected with its rise and progress alone. The subject, however, shall be considered elsewhere.

§. III.—PATHOLOGY OF REMITTENT FEVER.

The pathology of remittent fever has been the subject of some difficulty; but, by the information afforded by the dissections of Davis in the cases of the Walcheren remittent, Jackson in those of the West Indies, and Burnett in those of the Mediterranean, we have been enabled at least to understand the tendency of the morbid action.

The external appearances vary according to the stage of the disease at which death takes place. If it takes place early, the surface is only slightly tinged yellow; if later, the yellow tint is deeper, and more general and extensive. A dark livid or marbled appearance of the shoulders, extending to the hind-head, is almost invariable. Livid blotches or spots on different parts of the person, especially those which were subjected to pressure, are not uncommon; black or blue marbled lines on the belly are occasionally seen; and the scrotum is often livid. Petechial spots are occasionally seen; the belly is tense and tympanitic; and swelling and suppuration of the parotids are sometimes observed.

The membranes of the brain are always more or less, sometimes very much, injected and reddened; serous fluid is effused into the subarachnoid tissue, elevating the arachnoid membrane, and giving it an opaque thickened appearance, simulating coagulable lymph. The convolutions are more or less flattened. The hemispheres often preternaturally adherent. The substance of the brain is firm, but always more vascular, and presenting more numerous minute points and fissures effusing fluid blood than natural. The ventricles contain fluid, which is occasionally limpid and colourless, occasionally slightly yellow.

The lungs are always more or less congested, with dark-coloured blood, sometimes presenting appearances of inflammation, as effusion of frothy serum into the pulmonic tissue, and some degree of induration. Lymph is occasionally effused, connecting the pulmonic and costal, and the pulmonic and diaphragmatic *pleura*, with serous fluid in the general cavity of the membrane. The pericardium is generally reddened and injected, and its cavity occupied with more or less serous fluid. Clots of blood and fibrinous matter are found in the right side of the heart and the pulmonary artery, less on the left side.

The liver is generally rather larger, and more gorged with

blood than natural ; and the gall-bladder moderately filled with thick ropy bile.

The peritoneum is in general dull-coloured and grayish, void of its usual lustre, and covered by a ropy glutinous exudation. The omentum is shrivelled and shrunk. The mesenteric vessels are loaded with dark-coloured blood, and sometimes minutely injected. The stomach and intestines are much distended with air, and contain more or less dark-coloured muddy fluid like coffee-grounds, which also tinges the mucus adhering to their mucous membrane. When this is removed by washing, the mucous membrane is found much congested and injected with numerous well-filled red vessels, and occasionally studded with red arborescent or asteroid patches.

The spleen is generally soft, flaccid, and sometimes completely broken down.

The urinary bladder is contracted in size, and contains generally a little turbid high-coloured urine ; and its mucous membrane is more or less injected with blood.

The kidneys are more or less injected, and their vessels often loaded with thick semifluid blood.

These appearances, which indicate the effects of the febrile action in the different organs, show that the force or violence of that action, though operating generally on the whole system of capillary vessels, had nevertheless been most detrimental to the powers of life, by acting on the capillaries of the brain, its membranes, the lungs, the stomach, and ileum, and the liver and kidneys. Though almost all dissectors have neglected to make incisions into the muscles, there is no doubt, from what we see of the effects of fever in these parts in the fever of this country, that their vascular system must be very much overloaded with blood, which is both dark-coloured, and either moves slowly, or stagnates altogether. The loaded state of the lungs also, and the frothy, ropy, blood-coloured serum found in their tissue, is the result of the imperfect circulation of the blood in the pulmonary artery ; and it cannot be doubted, from the rapid respiration, and the inability of the lungs to be fully distended, that one of the effects of the febrile action is to impede and interrupt the natural free motion of the blood through the pulmonary capillaries, and thereby cause congestion, and a sort of passive peripneumony.

That the disorder in this function does not occupy so prominent a place in the symptoms during life, is to be ascribed,

I conceive, to the more early, and, at the same time, the more intense, disorder in the vessels of the brain and its membranes, and the stomach and ileum. This action, however, is not so exclusively confined to these parts, as to justify the denomination of *Meningo-gastric*, by which Pinel has proposed to distinguish the fevers of this family. The process of remittent fever, whatever it be, is evidently diffused over the whole capillary system,—that of the brain, the lungs, the alimentary canal, the secreting glands,—as the liver, pancreas, and kidneys, and also over the muscles and bones. It is, indeed, like fever generally,—an affection or disorder of the capillary system of the whole frame.

It appears, nevertheless, that though the action, or rather want of action, and derangement of function, is thus general, it displays its effects more conspicuously in certain organs, at different periods of the disease. Thus, in the first or incipient stage of remittent fever, the vessels of the brain and its membranous envelopes chiefly suffer; and the disorder is then an intense cerebro-meningeal one, of which the meningeal vessels are inordinately distended, and continue so until, either by the abstraction of blood, or other means, they are allowed to contract and relieve themselves, or a sero-albuminous fluid issues from them, and is poured into the subarachnoid tissue, and the cerebral cavities. This generally constitutes the early part of remittent; and the partial remission of heat and febrile action which ensues, is connected with the sero-albuminous effusion from the cerebro-meningeal capillaries.

In the meantime, the disorder of the gastro-enteric capillaries, which also commences with the general morbid action, but does not proceed with the same rapidity, now, however, attains a great degree of intensity, and gives rise, first to the secretion or separation of a great quantity of sero-mucous fluid from the gastro-enteric surface, and then to the separation from these vessels of more or less of the blood already stagnating in the vessels, and which they are unable to transmit to the veins. These vessels, in short, being, like those of the brain, distended beyond the power of spontaneously recovering themselves, become disorganized by the endurance of the distension, and allow their darkened contents to exude from their extremities, first in small quantity, afterwards most copiously, into the cavity of the stomach and intestines, where, if they remain

any time previous to ejection, they are still more completely embrowned and darkened by the operation of the acids, fluid or gaseous, (muriatic, carbonic, sulphuretted-hydrogen,) contained in the alimentary tube. This is the source of the dark-coloured fluids rejected by the stomach, and occasionally by the bowels, in the second and last stages of remittent fever, when intense, severe, and fatal.

The yellow tint of the eyes and the skin of the head, neck, and shoulders, which often takes place in remittent fever at the close of the first or beginning of the second paroxysm, has been generally ascribed to effusion of bile. This I believe to be a most erroneous notion; and it is sufficient to remark in its refutation, that, as the bile could only produce this appearance by circulating with the blood, the whole person ought at the same time and in the same degree, to assume the yellow tinge; which, however, is never the case. This yellow coloration, on the contrary, depends on a cause entirely different, and one which is connected with the disorganization of the capillaries of the brain and gastro-enteric membrane, and the effusion of sero-albuminous fluid in the former organ, and sero-sanguine fluid from the latter. The capillaries of the skin, in short, are in the same overdistended state as those of the brain, lungs, and alimentary canal, and whole system; and as this extreme distension continues and increases as the fever proceeds, the vessels at length yield somewhat, and allow serous fluid, very slightly tinged with the colouring matter of the blood, to exude. Indeed it is hardly requisite for the colouring matter to escape from the vessels; for if these vessels continue distended, which they do, and if the blood which they contain remains stationary and is not transmitted to the veins, the blood undergoes a partial separation; and the numerous minute vessels which at the onset of the fever gave the skin of the face its red distended appearance, and the eyes the injected ferrety aspect, will now render the former slightly yellow, and the latter yellow, dull, and muddy.

In most cases of Mediterranean and tropical remittent fever, death or recovery takes place about or before the period now mentioned; and the effusion in the membranes and into the chambers of the brain, with the severe affection of the gastro-enteric vessels, either of which alone would certainly inflict a mortal lesion, are, when combined, sufficient to extinguish the energies of the

most vigorous frames. In many instances, indeed, the symptoms of oppressed brain, as delirium, *typhomania*, coma, or complete insensibility, are the most conspicuous at the close of life; and death is in these cases to be ascribed to the suspension of the cerebral functions. When, however, the lesion of the brain is not sufficiently extensive to extinguish life, the disordered state of the pulmonary circulation begins to give a new character to the disease. The respiration becomes very hurried and frequent, from forty to fifty in a minute, laborious and panting, with short inspirations, in which the shoulders and upper part of the chest are elevated, while the lower part is contracted; the rattling of mucous fluid in the bronchial tubes and windpipe is heard, and increases gradually every hour; respiration continues to increase in frequency and laboriousness, with short and inefficient inspirations rapidly succeeded by expiration; and, the typhomaniacal state passing into coma more or less complete, death takes place, partly with coma, partly by asphyxia. The lungs are then found quite gorged with bloody fluid and frothy serum; the bronchial tubes inundated with frothy sero-mucous fluid; and a quantity of bloody serum, varying from eight ounces to a pound and a half, in the cavity of the pleura.

From these facts and observations it results, that in remittent fever, the impaired action and inordinate distension of the capillaries, though diffused over the whole frame, may be distinguished, as a pathological process, into three stages. The first is, when the distension of the cerebro-meningeal vessels is most conspicuous, and the close of which is marked by the temporary abatement, corresponding in all probability to the commencement of effusion from these vessels, from the pulmonary tissue and pleura, and from the gastro-enteric mucous membrane. The second is when the disorder of the gastro-enteric mucous membrane becomes fully established, indicated by increase of the burning pain at the pit of the stomach, incessant vomiting, first of slimy matter, then of dark-coloured fluid, with purging of the same, hiccup, tympanitic distension of the belly, and more or less yellowness of the surface. This stage often terminates fatally. But if it do not, the third, or that of oppressed respiration and pulmonary *asphyxia*, ensues, and at once terminates the disease and the life of the patient.

I have given the foregoing sketch of the semeiography, diffe-

rent varieties, etiology and pathology, of remittent fever, exactly as it is observed to occur in the different divisions of the habitable globe, without expressing any opinion as to its connection with, or relation to, the rapid and fatal disease denominated yellow fever, in order that every reader might be enabled, from a just view of all the facts, to form an opinion for himself on this important but difficult question.

I have now, however, to observe, that if we compare carefully, and without bias, the summer and autumnal remittent of the south of Europe, the Mediterranean fever, the tropical remittent of East and West Indies and Central Africa, the Bulam fever, or the fever of Sierra Leone and Fernando Po, on the one hand, with the yellow fever of Cadiz, Gibraltar, Malaga, Carthage, Leghorn, and that of Vera Cruz, Havanna, Jamaica, St Domingo, the West Indies generally, and the United States, on the other;—we shall be unable to discover in their essential symptoms and effects, in their progress and pathology any real difference in kind, and merely differences in intensity, degree, rapidity of progress, and generality of prevalence.

We observe, on the one hand, amidst the summer and autumnal remittents of Southern Europe, the Mediterranean, and the tropics, cases of fever in which no distinction can be drawn between the symptoms, the effects, and the rapidity of action, and those of the ordinary cases of yellow fever. We remark the same intensity of headach, and suffusion and muddiness of eye at the commencement, the same anguish and pain at stomach, the same unquenchable thirst and incessant vomiting, the same temporary abatement at the period when cerebro-meningeal effusion is commencing, the same yellow suffusion of the skin of the superior parts of the body, the same exacerbation of symptoms at the commencement and establishment of gastro-enteric disorganization, the same character of discharges, the same mode of termination, and the same morbid changes in the dead subject. The islands of Sicily, Sardinia, Corfu, Cephalonia, and Zante, present annually many cases of exquisite yellow fever in the form of the endemic remittent of summer and autumn.

Conversely, we observe in all yellow fever epidemics cases of ordinary fever, in which no difference can be traced between their symptoms and those of the remittents which prevail in

the summer and autumn of Spain, Italy, and the Mediterranean coasts and islands, of the East and West Indies, Central Africa, and the southern division of the United States. Among the cases of the virulent yellow fever of Vera Cruz, the Havanna, the West India Islands, and the United States, the physician daily recognizes cases which resemble, in all respects of symptoms, progress, and termination, the remittents of these countries during ordinary seasons. The most practised and accurate observer can trace no palpable difference unless in degree; and even this is not always cognizable. In the different yellow fever epidemics of Leghorn, Cadiz, Gibraltar, and Carthage, there appeared numerous cases of fever which, under other circumstances, would have been admitted to be examples of remittent fever. The general epidemic prevalence, however, caused the whole to be classed as yellow fever.

If any further proof were required of the identity in nature of the summer and autumnal remittent, and the disease named yellow fever, it may be found in the fact, that the fever which originated at Bulam, on the outlet of the Rio Grande in 1792, has been admitted to be yellow fever, and has not only unphilosophically, but in complete defiance to historical facts, been allowed to give its denomination to that disease. That yellow fever, that is, a remittent of extreme virulence, with yellowness, black vomiting, and other fatal signs, arose at Bulam in 1792, is matter of fact. That all subsequent epidemics of yellow fever are of the same origin and nature is true, so far as mere physical causes are concerned; but false so far as the question of local origin is considered. The same conclusion may be derived from the fact, that fever of a similar character originated in 1816 on the island of Ascension, from the crew of the Bann, which had recently arrived from the coast of Africa. These circumstances, however, shall be more fully considered elsewhere.

Lastly, while we remark that the forms of remittent fever differ not in kind, but in degree only, that difference is so graduated, that it has attracted the attention of physicians in almost all ages. It has been long observed that the remittents of Holland, France, and Germany, were only milder in character and longer in course than those of Spain, Italy, Greece, and the Mediterranean Islands, and that those of the latter were merely milder in symptoms, and less rapid in progress,

than those of the tropical regions. This was remarked by Cleghorn, Lind, Senac, Pringle, John Hunter, and Jackson. More recently it has been observed by those who have treated the remittent of the Mediterranean, that this disease bears the same relation to the endemic yellow fever of the West India Islands when sporadic, which the remittents of France, Holland, and Germany do to the Mediterranean fever. It appears, therefore, chiefly by its epidemic character, that the virulent yellow fever is to be distinguished, whether occurring in Europe or in the Antilles.

In conclusion, I conceive it is impossible to resist the inference, that in favourable situations, such as the Mediterranean islands and coasts, the west coast of Africa, especially Senegal, Sierra Leone, Fernando Po, and the Bight of Benin, and in the East and West Indies, remittent fever may in certain seasons, and in proper subjects, assume all the usual characters of exquisite yellow fever, and, providing there may be a sufficient supply of subjects, may prevail among them so extensively as to display the epidemic character.

One or two ships' crews, one or two regiments, or a body of colonists, from colder, more temperate, and more salubrious countries, are quite adequate to supply the materials for such epidemic attacks, and to enable the febrific principle to betray all its energy, and all its malignity.

These principles, which are indisputably established by numerous facts in our military, naval, and colonial history of late years, are of the greatest importance in suggesting the means of prevention, and in showing that in countries essentially insalubrious, all attempts at colonization must be abortive, and that the necessary evils of physical situation, climate, and season, ought to be counteracted by precautions in encampment, in clothing, in regimen, and discipline.

§. IV.—TREATMENT OF REMITTENT FEVER.

The utility of the pathological views now given is chiefly evinced, as they enable us to establish the treatment of remittent fever on a rational and solid foundation; and there are few diseases perhaps in which the value of rational pathological principles are more conspicuous.

They show, I conceive, indisputably, that in the treatment of the various forms of this disease one great curative indica-

tion only ought to be kept steadily in view, and every measure adopted promptly to fulfil it; and that all others are merely symptomatic, palliative, and temporary.

This curative indication is to abate and remove, by every possible means, the inordinate capillary distension in the different organs, but especially that of the cerebro-meningeal vessels, and to prevent that distension from proceeding to effusion, decomposition of intra-vascular blood, and capillary disorganization.

The means by which this indication is to be fulfilled are;—

1. remedies which act directly on the capillaries at large, and on the circulation of the brain in particular, as blood-letting, general and local, blisters, &c.; 2. remedies which act on the circulation of the gastro-enteric mucous membrane, as purgatives; and, 3. remedies which act on the circulation of the skin.

1. *Remedies acting directly on the capillary circulation at large, and on the head in particular.*—Perhaps there are few remedial agents which do not act on the capillary circulation, and through that on the cerebro-meningeal capillaries. But the means more directly referable to this head are blood-letting, general and local, shaving the scalp, the application of cold fluids and the cold affusion, and blisters.

From observing the rapid transition in remittent from violent action to great and irrecoverable feebleness, and the tendency to capillary disorganization and hemorrhage, all evacuation, but especially blood-letting, was believed to be injurious, free purging was dreaded, and the treatment of remittent fever was attempted by means of bark, opium, stimuli, and a very gentle occasional purge. This method, which was the offspring of speculation and hypothetical apprehensions, does not appear to have been very successful. With cases which would have recovered spontaneously, it appears to have been simply not very detrimental; but with the more intense and rapid forms of the disease it appears to have been rather injurious.

For destroying these prejudices, and showing the effects of a prompt and energetic system of depletion, we are almost entirely indebted to Dr Irvine, who, in his interesting work on the Diseases of Sicily, has shown in 1808 and 1809 the beneficial effects of depletion, general and local, and of every part of the antiphlogistic and refrigerant mode of treatment, in the summer and autumnal remittents of the Mediterranean islands.

In planning and executing this mode of treatment, Dr Irvine has so much more merit, that, at the period at which he went to Sicily, the dread of debility and collapse was general among medical practitioners, and the prejudices against every species of evacuation were obstinate and inveterate. Dr Irvine has, indeed, traced an outline of treatment, the result of experience, to which may be ascribed a great and beneficial revolution in the management of fevers in modern times.

The example of Dr Irvine has been very successfully followed by Jackson in the West Indies, Denmark and Burnett in the Mediterranean fever, and numerous practitioners in the East Indies and the colonies. By Mr Boyle and some others, on the west coast of Africa, it has been slightly modified to suit the climate, but not materially altered.

The efficacy of this mode of treatment, which I am now to specify, depends almost entirely on the promptitude with which it is employed; and if the first twenty-four or thirty-six hours are allowed to elapse, so much injury is inflicted on the cerebro-meningeal and gastro-enteric capillaries, that all means are unavailing.

The first measure, therefore, to be taken in every case of remittent is abstraction of blood from the arm, the jugular vein, or the temporal artery, to the extent of fifteen, twenty, or twenty-five ounces, according to the strength of the patient, and its effects on the headach and the pulse. If by this means the headach and pain of the orbits are decidedly abated, the mere application of cold water to the shaven scalp, with the free employment of purgatives, may be sufficient to enable the vessels to contract and perform themselves the rest of the cure. If, however, the pain of the head and orbits undergoes only temporary abatement, if the pulse continue quick, and tense, and throbbing, and the patient is squeamish, sick, or complains of much epigastric pain, it will be proper either to detract fifteen ounces more blood from the system, or to apply leeches to the temples or frontal region, and also to the epigastric, and promote the bleeding by the application of warm cloths or poultices.

The extent to which blood-letting should be carried, either in amount or by repetition, for the extinction or control of the febrile action of remittent fever, will depend on the constitu-

tion of the individual, the season, the climate, the effects produced, and the general character of the disease.

Robust, vigorous, young or adult Europeans bear and require blood-letting to be carried to a greater amount than the enfeebled, the aged, or natives of the countries in which the disease is endemial. From the testimony of Dr Hennen as to Corfu, Mr Muir as to Cephalonia, Mr Goodison as to Zante, and Mr Boyle as to Sierra Leone, it appears that natives of these places, and those who have been by long residence habituated to the climate, neither require nor bear blood-letting to the same extent as strangers from the colder and more temperate regions. In the case of British seamen or soldiers, therefore, it is requisite to bleed much more largely than in the case of natives either of the Mediterranean or the West India islands.

It is observed also by Dr Irvine, and by many subsequent practitioners in the Mediterranean islands, that the fevers which appear in the summer require blood-letting to a greater extent, and more urgently, than those which take place in autumn, when Dr Irvine states that blood-letting was not so useful, and much less frequently extinguished the disease. The remark is confirmed by Mr Goodison, Dr Cartan, and several others; and it appears either that the autumnal disease advances more insidiously, and with less striking and manifest traces of morbid action, or that the disorder of the capillaries is a more obstinate and deep congestion, less amenable to the mere hydraulic effect of blood-letting.

It further appears, that in very dry climates remittent bears blood-letting better than in those which are humid. Thus, in the dry rocky islands of the Mediterranean and West Indies, blood-letting is more requisite, and must be carried to a greater extent than in the humid atmosphere of the west coast of Africa, or in the Gulf of Florida and the Mosquito Shore.

It sometimes happens that in Mediterranean fever, even before ten or twelve ounces of blood are detracted, fainting ensues. But while it is seldom possible to expect this evacuation alone to extinguish the disease, or to subdue the morbid action of the capillaries, so far as to enable them to complete recovery, it is found that if, on the recurrence of headach and pain of the orbits, a vein is again opened in the course of an

hour, blood may be drawn to the amount of twenty, twenty-five, or even thirty ounces from the same patient without inducing fainting.

The quantity requisite to be drawn in this manner varies. In general it is impossible to expect a violent case of summer remittent in a British constitution to disappear under any quantity short of twenty-five or thirty ounces; and in many instances forty within twelve hours from the attack will be nearer the amount required. In most of Dr Irvine's cases the quantities were fifteen or twenty, repeated more than once. In those of Dr Burnett, twenty-five and thirty ounces were often drawn at once with the effect of extinguishing the disease; but in one case blood was drawn from the temporal artery within six hours to the amount of ninety ounces before it could be said that the morbid action was controlled.

The effect of blood-letting is in general to abate remarkably the pain, throbbing, and constriction of the head, and the pain of the orbits, to relieve epigastric oppression and tenderness, to render the pulse slower, less tense, and oppressed, and to render its motion freer and less embarrassed. If these results ensue, the final disappearance of the disease may be left to the contractile power of the capillaries now relieved from their excessive distension, and to the concurrent operation of the remedies now to be mentioned.

It is further remarked, that in certain seasons summer remittents bear blood-letting better than others. It is impossible in this place to consider the details. But the general rule is, that the remittents of hot, dry, and steady seasons require and bear blood-letting better than those of moist and variable seasons.

Under this treatment, with the auxiliaries immediately to be mentioned, most cases of remittent fever, if taken early, will begin to show symptoms of marked abatement and amelioration about the third or fourth day. The headach and epigastric pain will abate; the pulse will become less frequent by about ten or twelve beats, less tense and contracted or oppressed, and sensibly softer and fuller; the heat of skin will abate; and the patient will become less restless. If, however, the affection of the head continue, and if the eyes become rather heavy and muddy, it will be proper to apply a blister to the occipital or vertical region, or one on each pariet-

tal region. In some instances in which delirium is urgent, and *typhomania* approaching, leeches applied to the occipital region are of the greatest benefit.

2. *Remedies which act on the circulation of the gastro-enteric mucous membrane.*—I have already mentioned the detraction of blood from the epigastric region by means of leeches, as a means of abating the distension of the capillaries of the gastric tissues, and thereby diminishing the epigastric pain, the irritability of the stomach, and the tendency to disruption of the gastro-enteric capillaries. This local depletion, indeed, is so useful, that unless all the urgent symptoms of headach, pain of the orbits, and epigastric anguish have been removed by the general depletion, it is never safe to neglect its employment. It is so much more necessary that in general it enables the stomach to retain fluids and medicine, and facilitates the operation of the latter on the alimentary canal.

In all cases, however, whether the local and epigastric depletion be employed or not, it is quite indispensable to administer purgatives, not only to unload the alimentary canal, but to relieve the congestion of the gastro-enteric vessels, and thereby of the vascular system generally, and to co-operate with the measures already adopted for relieving the head. For this purpose the compound calomel bolus or powder ought to be given immediately after the attack, and its operation aided by three or four ounces of infusion of senna. In remittent fever the gastro-enteric mucous membrane is sometimes so insensible to the action of purgatives, and so perverted in properties, that the ordinary doses have little or no effect till after copious blood-letting from the system, or local depletion from the epigastric region by leeches. It is then requisite, besides these evacuating remedies, to repeat the calomel bolus perhaps the third time in the course of twenty-four hours. In other instances the same purgative medicine is, after being once or twice administered, less efficient than a different one, though milder in action; and it becomes requisite to change the purgative every day. Thus, at the onset of the disease, it may be proper to give the compound calomel bolus twice, and promote its operation by infusion of senna; next day to exhibit half a drachm of the laxative electuary, and repeat this after two hours; next day to exhibit three or four compound colocynth pills; and then to recur to calomel alone, or with the croton

oil and scammony in the form of bolus, or a full dose of castor oil, or compound powder of jalap. By these alternations more benefit is produced than by giving constantly the same purgative medicine.

Emetics, which have been occasionally administered in remittent fevers, are almost invariably injurious. In the remittents of temperate countries, as Holland, Germany, and Hungary, and in the remittents of wet seasons in the Mediterranean, they have been occasionally exhibited with the effect of relieving the gastro-enteric oppression, and sometimes the headach, and relaxing the skin. In the remittents, however, of hot, dry seasons, especially in the summer fever of the Mediterranean, and in the remittents of the East Indies and the Antilles, they have been ascertained by manifold experience to be detrimental, by increasing epigastric uneasiness and tenderness, aggravating the burning precordial anguish, and the irritability of the stomach, and often precipitating capillary disorganization, and the vomiting of black coffee-ground fluid.

Occasionally, however, it has been the practice to combine three, four, or five grains of antimonial powder with the same quantity of calomel, when the effect is to operate on the alimentary canal chiefly as a purgative.

3. Of *Remedies which act on the cutaneous circulation*, the best are the saline diaphoretics and diuretics, cold affusion, and warm fomentation of the extremities.

Among the saline diaphoretics the most convenient is the solution of acetate of ammonia (*aqua acetatis ammoniæ*), the citrate of ammonia, the citrate of potass in the form of effervescing draught, or common lemonade. Where the urgent symptom is irritability of the stomach, it is beneficial to give the effervescing draught, with five or ten drops of the sedative liquor, or solution of muriate of morphia.

The most powerful remedy, however, for operating on the cutaneous circulation is the cold affusion, which displays much more curative effect in remittent fever after venesection and local bleeding and purging, than alone. In short, while it is alone inefficient or unsafe, by increasing internal congestion, after suitable evacuation, it tends to cause the capillaries to contract, and to determine the secretions into their proper channel. It cools the skin, abates thirst, and determines to the kidneys. With the view of producing these effects it ought, if it does

not fatigue the patient, to be repeated three or four times daily. In cases in which it is either inconvenient or impossible to employ the affusion over the whole person, it is always desirable to pour a stream of cold water upon the shaven scalp every second hour, while the head of the patient is made to incline over the ledge of the bed; and in cases in which this is inconvenient or impracticable, cloths dipped in cold water, frequently renewed, ought to be applied to the head for half an hour, or one hour at a time, and renewed as often as delirium returns, or the scalp becomes hot.

With cold affusion, or cold to the head, it is of much importance in abating morbid heat, rendering the skin moist, diminishing restlessness, and promoting sleep, to apply warm fomentations to the hands and feet. To the latter it should be done twice daily, and always in the evening, for ten or twelve minutes at a time. The effect of this measure has been supposed to be ambiguous where there were symptoms of cerebro-meningeal congestion. It is doubtless injurious in all cases previous to, or unaccompanied by blood-letting, general or from the head, and purging; because it stimulates the vascular system, while the capillaries are still distended by a load of blood, on which they are unable to contract. But after suitable depletion, it tends with the cold to the head to elicit the blood in the natural direction, to restore the cutaneous discharge, and to promote sleep.

Under the use of the remedies now enumerated, if employed early in the disease, and carried to the requisite extent in degree and by repetition, most cases of remittent fever will be brought to that state in which the contractile powers of the capillaries will be enabled to complete the cure. The pulse may continue quick, the tongue foul, and the skin dry for two or three days; but while the head remains free from pain, and the stomach from sickness, the daily evacuation of the intestinal tube by purgatives, with the use of diluents, will be sufficient to carry the disease to a favourable termination.

When a patient is not seen sufficiently early to allow full bleeding to have the effect of removing at once all capillary congestion and distension, the treatment of the disease becomes more complicated. If the patient is seen only on the third and fourth day, blood-letting has very little chance of being of much use. Dr Irvine, however, states, that he bled as late as

the seventh day. But I am satisfied that the cases of remittent, in which the evacuation was attempted at this period, must have been much less rapid and violent than in ordinary circumstances. Blood-letting then becomes entirely experimental; and if the head is much affected with pain or heaviness, or the eyes suffused, it may be proper to try the effect of detracting ten or twelve ounces from the temporal artery, or applying leeches to the temples, and often even a blister to the vertex or occipital region.

In all cases of this kind, it is indispensable to shave the head, and employ the cold affusion, either generally, or to the head, and warm fomentations to the feet. And in some it is of great use to wash the surface carefully with warm water and soap, rub it well dry, and then, after some time, if there be a return of heat, to use the cold affusion.

In all these cases, also, in which the stomach continues irritable, and the epigastric region tender and painful, or tense and distended, it is of the greatest importance to apply leeches, and then a blister; to continue the active use of purgative remedies, and even occasionally to exhibit enemata of senna, or oil of turpentine, or both.

Saline medicines and cold affusion are in this stage of little avail; and the stomach is often so irritable, that, though the thirst is great, and the exhaustion extreme, nothing is retained. The physician must then attempt to allay this irritability by various sedative means, experimentally, indeed, but still often successfully. A little warm spiced wine, or bottled porter, wine and soda water, or good Madeira or hock, often remain when every thing else is rejected. Even chicken soup should be tried; and, so long as the irritability continues, every thing which the longings of the patient, or the ingenuity of the physician suggests, may be attempted. In this state, arrow-root, with wine and cinnamon, may remain, while every thing else is rejected.

As this state proceeds, the invention of the medical attendant is often sorely taxed to alleviate the distressing symptoms of constant epigastric burning and anguish, incessant hiccup, and frequent vomiting of dark-coloured fluid. The remedies usually recommended in this inauspicious state, are ether, sulphuric or nitric, ammoniated tincture of valerian, camphor, musk, and carbonate of ammonia. None of them is invariably

successful; and all of them occasionally afford temporary relief, yet produce no permanent benefit. The camphorated julep agrees with one patient, the ammoniated tincture of valerian with another, frequent small doses of ether with a third, and musk in doses of three or four grains with a fourth. Dr, now Sir William, Burnett speaks highly of the powers of carbonate of ammonia with the aromatic confection, and it may be tried in doses of from three to five grains every second hour, till it produces some effect, when it should be stopped. It is rarely desirable, indeed, to give more than a scruple of this substance in the course of twelve hours.

Mercury, either in the form of calomel, blue pill, or inunction, in order to affect the constitution, has been much commended in the treatment of remittent fever, and by none more than by Dr Fergusson, who represents it to be by far the most powerful means, after the use of blood-letting, in obviating visceral congestion in the second stage of remittent fever. (*Medico-Chir. Trans.* ii. p. 189). It is, indeed, as a mere mercurial, of no use, or rather injurious in the early and active stage of remittent fever; and numerous observations show that calomel or blue pill is advantageous at that time only in proportion to the purgative and evacuant effect. It is, therefore, if to be used at all, to be employed in those cases only in which life has been prolonged to the second stage, without decided proof of disorganization of the cerebro-meningeal or gastro-enteric capillaries.

After the proper febrile symptoms have been subdued, it is of the utmost moment to regulate the different functions in such a manner as to prevent relapse. The bowels should be emptied regularly every day by the colocynth pill, taken the previous evening to the extent of twenty or twenty-five grains as requisite; and occasionally made to act more powerfully and steadily by the conjunction of six or eight grains of calomel, or ten grains of blue pill.

The diet should be confined to those articles which nourish without stimulating; and solid animal food ought to be withheld so long as the tongue is red, dry, or furred, and the pulse preternaturally frequent.

CHAPTER III.

YELLOW FEVER AND BLACK VOMIT OF WEST INDIANS AND AMERICANS.

Febris Flava, *Typhus Icterodes*, Sauvages and Cullen; *La Maladie de Siam*, *La Fievre Matelotte*, *Vomito Prieto*, *Chapetonada*, *Fiebre Amarilla Hispanorum et Hispano-Americanorum*; New Distemper of 1691; Kendal's Fever, Pestilential Fever, Bilious Fever of Gamble; Endemial Causus or Burning Fever of Moseley; Malignant Pestilential Fever of Chisholm; Remittent and Bilious Remittent of Hunter; Concentrated Endemic Fever of Jackson; Tropical Continued Fever of Lempriere.

A Treatise of the Diseases most frequent in the West Indies, and in particular those which occur in Barbadoes, by Richard Towne. Lond. 1726. 8vo.—A Treatise concerning the Malignant Fever in Barbadoes and the Neighbouring Islands; with an account of the Seasons there from the year 1734 to 1738, by Henry Warren, M. D. Lond. 1741. Joannis Moultrie, M. D. *Dissertatio Medica de Febre Maligna Biliosa Americæ*, Anglice the Yellow Fever, *Habita die 10 Martii 1749, in Academia Edinburgensi pro gradu Doctoris*.—The Natural History of Barbadoes, by the Reverend Griffith Hughes, A. M. Lond. 1750, p. 37. [Adopts Warren's account, but refers to the experience of Dr Gamble].—An Essay on the Bilious or Yellow Fever of Jamaica, by John Williams. Kingston, 1750. Pp. 55.—Observations on the Changes of the Air, and the Concomitant Epidemical Diseases in the Island of Barbadoes, to which is added a Treatise on the Putrid Bilious Fever, commonly called Yellow Fever, &c. by William Hillary, M. D. 2d ed. Lond. 1766.—An Essay on the Diseases incidental to Europeans in Hot Climates, by James Lind, M. D. Lond. 1768–1808, Part i. chap. iv. *Unwholesome Seasons and Diseases of the West Indies*.—A Description of the Yellow Fever of South Carolina, by Dr John Lining. Edinburgh Physical and Literary Essays, Vol. ii. Art. 29.—A Treatise on Tropical Diseases, and on the Climate of the West Indies, by Benjamin Moseley, M. D. Lond. 1786, p. 361, On the Endemial Causus of the West Indies or Yellow Fever.—Observations on the Diseases of the Army in Jamaica, and on the best means of preserving the health of Europeans in that Climate, by John Hunter, M. D. Lond. 1788, Chap. iii. Of the Symptoms of the Remittent Fever.—A Treatise on the Fevers of Jamaica, &c. by Robert Jackson, M. D. London, 1791.—An Essay on the Malignant Pestilential Fever introduced into the West Indies from Boullam, on the coast of Guinea, as it appeared in 1793–94–95–96, by Colin Chisholm, M. D. 1st edit. Lond. 1794. 2d edit. Lond. 1801. 2 vols. 8vo.—An Account of the Bilious Remitting Yellow Fever as it appeared at Philadelphia in the year 1793, by Benjamin Rush, M. D. 8vo. Philadelphia, 1794.—A Medical Sketch of the *Synochus Maligna*, or Malignant Contagious Fever, as it appeared in the city of

Philadelphia, to which is added some account of the morbid appearances after death observed on dissection, &c. by Isaac Cathrall. Philadelphia, 1796. Pp. 94.—An Account of the Epidemic Yellow Fever as it appeared in New York in the year 1795, &c. by Valentine Seaman, M. D. New York, 1796. 1p. 52.—An Account of the Epidemic Fever which prevailed in the city of New York during part of the summer and fall of 1775, by Richard Bayley. New York, 1796.—An Inaugural Essay on the Yellow Fever as it appeared in this City (New York) in 1795. Submitted to the public examination of the Faculty of Physic under authority, &c. for the degree of Doctor of Physic, on the 3d May 1797, by Alexander Hosack Junior, A. M. of New York. New York, 1797.—A Treatise on the Yellow Fever as it appeared in the Island of Dominica in the years 1793-4-5-6, by James Clark, M. D. 8vo. Lond. 1797.—Practical Observations on the Diseases of the Army in Jamaica as they occurred between the years 1792 and 1797, &c. by William Leimpriere, Apothecary to his Majesty's Forces, in 2 vols. 8vo. Lond. 1799. Chap. iv. vol. ii. *Of the Tropical Continued Fever.*—Observations on the Diseases which prevailed on board a part of his Majesty's Squadron in the Leeward Island Station, between Nov. 1794 and April 1796, by Leonard Gillespie, M. D. Lond. 1800.—Medical Inquiries and Observations, by Benjamin Rush, M. D. in 4 vols. 2d edit. Philadelphia, 1805, which also contains annual reports of this disease as it appeared in the same city in 1794-95-96-97-98-99, 1800-23-4-5.—Della Febbre Gialla nell Livorno in 1804, de G. Palloni a Livorno 1806.—An Outline of the History and Cure of Fever, Endemic and Contagious, more expressly the Contagious Fevers of Jails, Ships, and Hospitals, the Concentrated Endemic, vulgarly called the Yellow Fever of the West Indies, &c. by Robert Jackson, M. D. 2d edit. Edin. 1808.—An Essay on the Disease called Yellow Fever, with Observations concerning Febrile Contagion, Typhus Fever, Dysentery, and the Plague, partly delivered as the Gulstonian Lecture before the College of Physicians in 1806 and 1807, by Edward Nathaniel Bancroft, M. D., Lond. 1811.—Reports on the Pestilential Disease of Andalusia which appeared at Cadiz in the years 1800, 1804, 1810, and 1817, by James Fellowes, M. D., &c. Lond. 1815.—Notes on the West Indies, including Observations relative to the Creoles and Slaves of the Western Colonies, and the Indians of South America, interspersed with Remarks upon the Seasoning or Yellow Fever of Hot Climates. 2d edit. by George Pinckard, M. D., &c. &c. in 2 vols. Lond. 1816.—Observations and Inquiries into the Nature and Treatment of the Yellow or Bulam Fever in Jamaica and Cadiz, &c. by Edward Doughty, F. R. C. S. L. Lond. 1816.—A Sequel to an Essay on Yellow Fever, principally intended to prove, by incontestible facts and important documents, that the Fever called Bulam, or Pestilential, has no existence as a distinct or contagious disease, by Edward Nathaniel Bancroft, M. D. Lond. 1817.—A Sketch of the History and Cure of Febrile Diseases, more particularly as they exist in the West Indies among the Soldiers of the British Army, by Robert Jackson, M. D. Stockton and London, 1817.—An Inquiry into the Nature and Origin of Yellow Fever as it has lately appeared in the West Indies, by William Fergusson, M. D. &c. Medico-Chirurgical Transactions, viii. 108 and 585. (One of the best and most distinct views of the Etiology of Yellow Fever.) Lond. 1817.—History of the Progress, and Inquiry into the Causes, of the Yellow Fever as it appeared in the Island of Antigua in 1816, by A. Musgrave, M. D. Medico-Chirurg. Trans. ix. 93. Lond. 1818.—Observations on the Inflammatory Endemic, commonly called Yellow Fever, as the disease occurred to the Author during a public service of twenty years in a majority of the West India Colonies, &c. by Nodes Dicken-

son, of the College of Surgeons, &c. Lond. 1819.—Remarks on the Epidemic Yellow Fever as it has appeared at intervals on the South Coast of Spain since the year 1800, by Robert Jackson, M. D. Lond. 1821.—*Recherches Historiques et Medicales sur la Fievre Jaune*, par M. Dalmas, D. M. A Paris, 1822. 8vo.—*Essai sur la Fievre Jaune d'Amerique*, &c. par P. F. Thomas. Nouvelle Orleans et Paris, 1823. 8vo.—*Observations sur la Fievre Jaune observée a Cadiz in 1819*. 4to. Par M. Pariset. Paris, 1822.—Remarks on the Yellow Fever of the South and East Coasts of Spain, &c. by Thomas O'Halloran, M. D. &c. Lond. 1823.—*Hist. Med. de la Fievre Jaune observée en Espagne in 1821*, par MM. Pariset, Bally, et François. Paris, 1823.

FEW diseases have given rise to a greater number of publications, or have occupied a greater proportion of medical writings, than that to which the name of Yellow Fever has been applied. Yet it is remarkable, that, in perusing the descriptions which have been given, it is difficult to fix on any prominent or uniform characters, until the disease is so far advanced that this is of little consequence; and among different authors we perceive considerable discrepancy in detailing the order and kind of symptoms by which the presence of yellow fever is attended. I believe that this variation is to be ascribed to the different situations in which the observers were placed, or to the peculiarities of the epidemic from which they formed their descriptions, or to the peculiar circumstances of the subjects or cases which fell under their observation. In other words, I think that the testimony of the various authors who have described yellow fever epidemics, shows that the symptoms, the violence, and the progress of the disease, vary according to the kind and force of the cause or causes concerned in its production; according to the organic vigour and vascular susceptibility, or peculiar constitution and habits of the individual; according to the season of the year, and the region or latitude in which the disease prevails; and, finally, according to the operation of external causes in general, or the treatment employed. I believe that it is in this manner only that it is possible to explain and reconcile the differences of yellow fever, as described by Towne, Warren, and Hillary in Barbadoes, Moultrie and Lining in Charlestown, by Moseley, Hunter, and Jackson in Jamaica, by Chisholm in Granada and several of the Caribbean Islands, by Rush in Philadelphia, Seaman and Hosack in New York, Clark in Dominica, and Lempriere and Gillespie on shipboard in the Leeward Island station. While I admit the correctness and fidelity of the delineations furnished

by each observer, and doubt not that each described the fever very nearly, if not exactly, as it occurred to him, I am disposed to infer, that it is almost impossible to give any description that will be true as a general and uniform character; and the physician who is desirous to know the series and combination of morbid actions which constitute yellow fever, must connect these actions with the circumstances in which the fever originates, and with the physiological or organic peculiarities of the individuals, or the persons in whom it occurs.

These considerations induce me to think that the descriptions which Dr Jackson has given of this disease accord much more closely with the characters which it presents than any given by former authors; and though the distinctions of this observer are perhaps too minute and numerous to be implicitly adopted, they afford the only rational mode of explaining the varieties, and reconciling the differences, which the several histories of this disease furnish. I shall therefore, in the following history, attempt to trace the characters of the most common forms of yellow fever, as nearly as may be, after the model of this accurate and laborious observer.

§. I.—SEMEIOGRAPHY OF YELLOW FEVER.

A. The first variety is Open, Violent, and Simple Tropical Fever.—The most distinct idea of the symptoms and peculiarities of this disease is obtained from observing the phenomena of its concentrated form in young persons of robust constitution and sanguine temperament.

The concentrated form of yellow fever commences in one of two modes. In some instances the peculiar symptoms of squeamishness, languor, and violent headach, appear suddenly without previous illness. More frequently, however, its approach is gradual. A person about to be affected with yellow fever complains, generally about the latter part of the day, of weariness, unusual restlessness, dull headach, and squeamishness, with slight sensations of cold and shivering recurring at intervals. A distinct fit of shivering is rare. When these complaints have continued for six or eight hours, sometimes only three or four, they are followed by intense general heat, great pain and throbbing of the head and eyeballs, and an uneasy sensation of squeamishness and oppression, referred to the region of the stomach. If the sensations and the several functions be exa-

mined at this time, they are generally found in the following state. The head is the seat of excruciating pain, which is more particularly described as darting through the forehead and temples, and accompanied with a sense of tightness or girding round the head. The eyes are red, muddy, and watery, as if they were galled by wood-smoke; the eyeball protruded; the orbits are deeply painful; and exposure to light is either irksome and painful, or entirely shunned. The countenance is flushed, sometimes crimson; in other cases, it is bloated, dull, and heavy, with an embrowned or orange-red tint. In all cases the physiognomy is expressive of anguish, restlessness, or pain. The loins, the joints, and the calves of the legs, are generally racked with severe bruising pains; and cramps of the muscles, similar to those in cholera, are not uncommon. When delirium occurs, which is said not to be often, it is violent and temporary.

The appearance of the tongue is very variable. It is generally covered with a white or yellowish clammy fur, somewhat moist; it is rarely dry, unless toward the conclusion of the period which I am at present describing. There is generally much thirst and dryness of throat; but when squeamishness or sickness are considerable, these complaints are less severe. From the first appearance of fever, the patient is distressed with squeamishness (*nausea*), sickness, and an enfeebling oppression at stomach, which are at length succeeded, especially after swallowing food or drink, by efforts to vomit, with discharge first of matters contained in the stomach at the hour of attack, afterwards of considerable quantities of watery, mucous fluid, and bile which is yellow, green, or tinged with blood. According to some authorities (Jackson, p. 60), however, bile is rarely vomited at this time, unless the disease consist of distinct paroxysms and remissions. With these fits of vomiting, the uneasiness referred to the epigastric region is much augmented, and is aggravated by a sense of heat and tenderness so painful, that pressure cannot be borne. At the same time the bowels are constipated, and either moved with great difficulty, or entirely insensible to the action of powerful cathartics. The secretion of urine is generally scanty, sometimes almost suspended.

The pulse is frequent, small, and contracted, or irregular, hurried, and tumultuous. The breathing is oppressed or panting, and accompanied with much anxiety, and frequent sighing.

The skin is usually hot, dry, and parched, feels thick and inelastic, and is either not at all, or with difficulty, affected by the usual irritants. It is said in some instances to be moist; but this is never the case in this period of the form of yellow fever which I am describing, unless at its termination, when it becomes clammy or unctuous at particular parts, as the epigastrium, flexures of the joints, &c. The kind of heat is almost uniformly pungent, especially if ascertained by grasping part of a limb in the hand, when it seems so violent and irresistible, that scarcely any of the usual means suffice to diminish its intensity.

The state of sensations and functions which is now described, continues about ten or twelve hours, and constitutes what has been named the attacking or commencing period or fit of yellow fever. It appears to be what most authors have described under the name of *first stage* of yellow fever. But it does not appear to be quite well established whether they have not confounded it and united it with the second or formed period of the disease; for many of the phenomena found in the latter only, have been represented by these authors as occurring in the former. I adhere in this case to the view of phenomena given by Dr Jackson, who represents it as an incipient or forming stage, continuing about ten or twelve hours.

About this time the sufferings of the patient undergo some relief; the pain of head is diminished, the eye and countenance become serene, and the general heat is less oppressive. There is, in short, an *abatement* for a few hours, five, six, or ten. This, however, is often indistinct or imperceptible, and its duration is always short and uncertain. The symptoms then return in an aggravated form. The pain of head, which had abated, becomes insufferable, and is accompanied with violent throbbing of the carotid and temporal arteries. The watery and muddy aspect of the eye returns, and the countenance is flushed or crimson, with an expression of wildness and agitation which is not easily described, but which, when once seen, cannot be forgotten or mistaken. In other instances, when the pain of head at this period is less severe, the individual complains of heaviness and fulness through the whole head, is drowsy, but cannot sleep; and while the eye is watery and dull, the countenance, instead of being flushed or otherwise coloured, is bloated, grim, and confused, with a look of wild stupidity. In

both cases the mind is confused, and the speech incoherent; but delirium, if it is violent, is temporary, if merely moderate or accompanied with muttering, more lasting.

The pulse is quick, full, tense, and generally strong; but it still beats in such manner as if it was prevented from unfolding itself to its full strength. The breathing is hurried and panting, sometimes irregular, occasionally deep and laborious, more particularly when drowsiness or stupor seem to oppress the head; always with much anxiety and jactitation.

The skin is dry, hot, and inelastic; incapable of being rendered perspirable, or of undergoing the usual inflammation occasioned by blisters. In general the tongue is dry and husky, with intense thirst, to which, however, the patient is not always sensible. The squeamishness and sickness of the initial period is augmented by vomiting, with burning pain and anguish referred to the pit of the stomach. The bowels continue bound, and incapable of being moved by energetic purgatives, —or if stools be procured, they are watery, and do not unload the intestines. The urine is high-coloured and scanty, in some instances the secretion is suspended or suppressed.

In cases, the symptoms of which are violent, a fatal termination may take place in the course of this stage, or previous to its conclusion. In such circumstances death is generally preceded by coma or convulsions, but it may take place also without these phenomena.

This state, which is considered as the formed period or fit of the disease, varies in duration according to the subject, and the circumstances of treatment. In the most violent forms, uncontrolled by remedial or other means, it has been known to terminate in twelve hours from the time of attack,—a circumstance which perhaps never occurs unless in the most sudden, violent, and rapid cases, and which may be justly regarded as the minimum of duration of these symptoms. Not very different from this is the period of twenty-four hours, before the elapse of which this stage of the disease may be concluded. In other instances, which are certainly more common, where the morbid process has been modified by the interference of art or other causes, this period continues thirty-six or forty hours, (Jackson, p. 54), which may be regarded as its average duration in robust adults, in whom the actions of the vascular system are of ordinary energy. In other instances, again, in

which the symptoms are not violent, or are controlled by energetic agents, or in which the genuine febrile action is imperfectly developed, this stage occupies forty-eight or sixty hours, (Moseley, p. 408), or is continued even to three revolutions of twenty-four hours (Hunter, p. 80), without manifesting marks of abated severity.

The termination of the formed period of yellow fever is known by abatement more or less considerable of the violence of the symptoms. The heat of the body and skin undergoes a gradual diminution, till the extremities and surface, unless in the trunk and at the epigastric region, are actually cooler than natural. The pain of head becomes less violent, or disappears, or is succeeded by slight stupor or drowsiness, if these symptoms have not already appeared. The countenance is no longer flushed, nor the aspect agitated. The pulse also becomes uniformly soft, less strong, and full, and undergoes a gradual diminution in frequency, until in some cases it is natural, or falls below the natural standard. (Moseley, 408. Hunter, 84. Gillespie, 40). The tongue even becomes moist, red, and cleaner at the edges, as in a person convalescent from disease.

But while these circumstances announce in many respects a healthy state of functions, attentive examination soon shows that the patient is still labouring under his disease. Though the skin has lost its pungent and burning heat, it does not recover the soft, free, and perspirable state of health; it is clammy, unctuous, and sometimes colder than natural, or alternately scorched and chilled; it feels thick, inelastic, and is incapable of being affected by the ordinary irritants. Though the headach is gone, drowsiness and stupor generally succeed; the countenance is heavy, grim, and inanimate; the eye, though serene, becomes dull and lustreless, and in general with a dilated pupil, vision is indistinct or impaired. About the same time a tinge of yellow in the white of the eye, round the orbits, at the temples, and at the angles of the mouth, generally appears.

These phenomena constitute what most authors have agreed to term a *remission* or rather abatement; and they mark the termination of what has been named the *first stage* or *fit* of yellow fever. In the descriptions of some authors they are considered to form a stage by themselves, which has been denominated the second stage of yellow fever. There can be little doubt that it is more natural and correct to consider it as

an abatement simply, denoting the termination of the formed or proper period of yellow fever, and the beginning of a new series of phenomena, which may be with sufficient justice named the concluding or declining period of the disease.

The phenomena to which I allude occur nearly in the following order. When the abatement of the proper febrile symptoms is distinctly established, the squeamishness, oppression, and tenderness of the epigastric region augment. These are quickly accompanied with sickness, obscure and interrupted hiccup, and at length vomiting. The matters rejected, which in the previous stage had been clear and ropy, are soon mixed with dark-coloured flakes; afterwards they consist of a semi-fluid substance, which has been compared to coffee-grounds. As the disease advances, retching and vomiting are almost incessant; and after every fit of vomiting, the matters ejected are darker coloured, until like a mixture of soot and water, or completely inky. This is the phenomenon which the Spaniards have named *black vomit* (*vomito prieto*), and by which the disease is not unfrequently distinguished among them. At the same time the bowels, which had previously been bound, or incapable of being affected by medicine, begin to be loose, and to discharge black or tar-like stools, or sooty fluids containing minute granular bodies like glazed gun-powder. These symptoms, especially if conjoined with hiccup, are almost invariably mortal.

During the progress of these morbid actions, the countenance continues grim, dull, inanimate, and sallow-coloured. The yellow tinge, which appears first at the orbits, temples, and mouth, extends gradually, but often rapidly over the face, neck, and shoulders, and finally occupies the greater part of the cutaneous surface. The extremities become cold; the skin of the forehead and other remote parts is bathed in clammy, unctuous sweats; the arms, knees, and legs, become marbled, tawny, or mahogany, and bluish-red or livid patches appear on the belly, scrotum, and inner surface of the thighs; and blood oozes from the nose, gums, and bowels. The tongue is generally moist and red; the pulse small, feeble, and not much more frequent than natural, becomes finally intermitting, and cannot be felt at the wrist; the respiration, which had formerly been quick and oppressed, becomes languid, and is drawn in long catches; and a few convulsive struggles, or long deep

efforts at inspiration, in other instances comatose stupor, are the last marks of ceasing life.

The duration of this concluding stage, and the period at which its most characteristic symptoms appear, vary in different subjects and under different modes of treatment. In ordinary instances of this form of yellow fever, the declining or concluding period commences about the termination of the third diurnal revolution of twenty-four hours; in other words, about the beginning of the fourth day. Vomiting of sooty or inky fluids occurs in such cases about the middle of the fourth day, that is, the evening of the fourth or morning of the fifth day; and death generally follows in the course of six or eight hours. If, however, the disease terminates fatally before the third day, which may happen in rapid and violent cases, the process of the concluding stage is never commenced, and yellowness is rare, and black vomiting scarcely ever seen. In such cases the fatal event takes place either by coma or convulsion. According to Dr Jackson, whose observations appear most precise, the usual course of the disease consists of twelve hours of forming period, thirty-six or forty-eight of formed or proper fever, and twenty-four or thirty-six of declining or concluding period. (Jackson's Treatise, p. 263.)

In most instances of yellow fever, the discoloration of skin precedes the black vomiting, or makes its first appearance while the individual is distressed with squeamish oppression only. It has happened, however, that black vomiting came on suddenly without much previous sickness or gastric oppression, and without previous yellowness of the face or person. In such cases, the matter vomited was intensely black, the patient turned yellow in an instant, and death followed quickly. (Outline, chap. v. p. 189.)

Such is the course of phenomena in the most concentrated form of yellow fever occurring in the persons of young, robust adults,—generally Europeans recently arrived in the West Indies. Variations, however, in violence and rapidity of progress are found to take place.

It may appear with less violent symptoms in consequence either of original mildness, or because it has been rendered so by appropriate management. It is unnecessary to enumerate the state of particular symptoms, and it is sufficient to say that, in general, they are less violent and more easily controlled in

the whole course of the disease. The headach is often severe, but it is less continuous, and the eyes are not so much affected as in the concentrated form. The tongue is generally furred, the thirst considerable, the skin warm, or even hot, but without the peculiar pungency, and prone to warm and natural moisture. The patient is squeamish and sometimes vomits, but without the distressing and enfeebling epigastric agony; and the matters are merely viscid, mucous, or bilious, never dark coloured. The bowels are bound, but are easily affected by medicine, and when moved discharge feculent stools. The pulse in the early or invading stage is frequent, small, and contracted; afterwards full, strong and hard, but more open and free than in the concentrated fever. Respiration, though quickened somewhat, is not panting, or performed in sobbing catches. Confusion of thought and speech are common; and in some instances furious raving is combined with extraordinary efforts of muscular strength. These symptoms continue in various degrees of violence, with occasional abatement, till the fifth, seventh, or ninth day, when, in general, perspiration appears at the head and neck, and gradually extends over the trunk and extremities till it becomes general. About the same time pustular eruptions about the mouth appear; the pulse becomes less frequent, soft, and full; the tongue is cleared of its fur; and appetite for food, sometimes keen, announces the cessation of fever. Instead of this favourable termination, however, this mild variety sometimes proceeds to a fatal conclusion in the following manner. While the pulse continues full, frequent, open, and free, till the fifth or even the seventh day, instead of cutaneous moisture, the skin continues dry and closed, the pulse becomes less frequent and weaker, the temperature of the surface diminishes, while the other symptoms of febrile action continue; an olive dingy yellow occupies the skin about the sixth or seventh day; blood oozes from the mouth and nostrils, frequently from the whole tract of the alimentary canal, or even the whole of the mucous surfaces; the pulse becomes frequent, small, and intermitting; and the patient dies in a state of extreme weakness some time between the seventh and fourteenth day.

In cases which terminate fatally, various appearances are found after death, and some are to be considered as accidental, or liable to much variation.

In general the blood-vessels of the cerebral membranes are numerous, distended, and filled with dark-coloured blood; dark-coloured spots are found on the hard membrane (*dura meninx*), near the sutures, or at the falx. The substance of the brain is said to be firm, and traversed by numerous blood-vessels. The choroid plexus is often quite like a clot of blood. In some cases, but not generally, water is found in the cerebral cavities. This last is most frequent where the disease has consisted of paroxysms and remissions.

The lungs never present morbid changes unless accidentally.

The peritoneum, omentum, &c. are generally of a grey dirty olive colour, dry, without the ordinary moist glistening aspect, and in some instances traversed by enlarged vessels. The stomach is generally much distended, sometimes smooth, sometimes rugous interiorly, generally containing a large quantity of fluid like muddy coffee, or of a darker colour; in other instances this fluid is pale and dirty, and viscid, with shaggy flakes floating in it. The vessels of the stomach are generally much distended with dark-coloured blood; the mucous coat abraded, loose, and easily detached, showing the subjacent surface streaked, bright, or dark red, or dotted with numerous red points. These appearances are most numerous at the cardiac region, but are not confined to this part. Careful examination also shows numerous canals containing a dark coloured fluid, which could easily be forced through open orifices into the cavity of the organ.

The inner surface of the intestinal tube, especially of the duodenum, is not unlike. Its mucous surface is abraded, loose, or detached; the subjacent vessels contain a dark fluid, thick and viscid like molasses, more especially in the colon. In those parts in which the mucous coat is entire, a velvet or downy substance of a sky blue or dark purple colour, sometimes of considerable extent, is found.

The liver is distended, heavy, and generally larger than usual, of a spotted or variegated colour like marble; the blood-vessels filled with dark fluid blood, the biliary pores with dark fluid. The gall bladder is sometimes empty, sometimes filled with dark-coloured thick fluid, like tar or molasses; the ducts are pervious.

The spleen is generally distended, sometimes ruptured.

The urinary bladder is generally shrunk or contracted, its coats are thickened and firm, and it contains little urine.

In cases of the milder variety which terminate fatally, the intestinal canal frequently contains a quantity of effused blood, the dark colour of which has caused some observers to consider the intestine in such circumstances as mortified. When, however, the blood is removed, the mucous membrane, though occasionally and partially reddened, is in other respects natural. The spleen and liver are generally gorged with semi-fluid grumous blood.

B. The second modification of yellow fever which deserves notice occurs in the persons of those whose organic tissues appear to be deficient in energy of living properties ;—in whom muscular irritability is moderate, secretion natural, but not easily or frequently augmented ;—or it may be briefly characterized as that in which the action of the vascular system is deficient or oppressed, and the energy of the various secretions is impaired.

This commences either suddenly with giddiness, dimness of sight or temporary blindness, quickly followed by headach, faintness, squeamishness, and the usual train of complaints ; or approaching more gradually may be preceded for hours or even days by general but inexpressible indisposition, in which languor, inappetency, and even squeamishness, are most conspicuous. After the first symptoms of attack, the formation of the disease goes on in the following manner. The headach, which may be heavy and oppressive, or acute and tensive, is soon attended with squeamishness (nausea), retching, and vomiting, and deep-seated pains of the loins, knees, and legs. A fixed sensation of cold pervading the person deeply, and rarely interrupted with flushing and other marks of heat, is slowly succeeded by a sensation of heat, which, though pungent at the epigastric region, under the arms and inside the thighs, is seldom strong or high on the exterior of the person or the mucous surfaces. The skin is generally dry, soft, and inelastic, or damp and greasy, but without the free warm moisture of health. If the patient be thirsty and squeamish, the tongue is generally covered with a rough white fur ; in other cases it is smooth and pale, and the mouth filled with glutinous slime. There is nothing very uniform in the state of the bowels ;

they are generally bound, and if open, either spontaneously or by art, the discharges are scanty, and do not empty them of their contents. The pulse is always very small and weak ; if frequent it is irregular, but in many cases it is not much quicker than natural, and differs from the healthy pulse in strength and openness only. At the same time the countenance is dull and inanimate, almost never flushed, but more frequently sallow, bloated, with a lurid expression ; and the eye, instead of the watery irritated appearance so remarkable in the first variety of yellow fever, is dingy, muddy, and dull in aspect, and slow, and languid in its motions.

This state of symptoms, which constitute the incipient or forming period of the disease, continues about twelve or fourteen hours ; when an abatement, accompanied with partial moisture of skin, generally takes place for a short time. The febrile action then recurs, and presents the following train of symptoms, varied only by diurnal risings and fallings. Pain of head, more or less severe, is attended with confusion of thought, dulness of perception, wandering and incapacity of attention,—forming a low degree of delirium, with more or less wakefulness. The countenance sallow, lurid, or bloated, from the hour of attack, becomes dingy and inanimate sooner or later, and sometimes has the torpid aspect of a marble statue. The eye gradually loses its lustre, and sometimes its veins become distended. The lips are dry and pale, the mouth clammy, the tongue foul, sometimes dry ; and if its state indicates thirst, the patient is little sensible of the appetite. The skin is thick and torpid, or insensible to usual irritants ; that of the face and some other parts is generally damp and unctuous. Squeamishness and pain of the epigastric region are common, and in most cases the patient vomits viscid matters.

The pulse is always weak and languid, seldom frequent till the conclusion of the disease ; and rarely rises to 100 in the minute.

With these symptoms the disease may terminate fatally by coma or convulsion on the third or fifth day ; but this is more common on or about the seventh, and in other cases it has continued to the twelfth. The process which terminates in death is various. The skin, which had never been warm, becomes cool, dry, and inanimate, or damp and flaccid, and at the same time of a dingy grey or dirty olive interspersed with

darker-coloured spots, like the traces of recent but recovering bruises. The white of the eye also assumes a tallow-yellow tinge, with distension of veins, and a death-like, forlorn expression. In the meantime blood oozes from the nose, mouth, gums, and the entire tract of the alimentary canal; the ropy matters discharged by vomiting are mixed with shaggy flakes and clots of blood; and in some instances worms, living or dead, escape by the mouth. The bowels become loose, discharge bloody and fetid stools, and in some instances pure blood mixed with shreds of membrane. The urine is retained, or rather its secretion suspended; yet the patient complains of strangury. The pulse becomes still weaker, intermits, and at length cannot be felt at the wrist; and while the mind wanders in confused reverie, the patient is either suddenly destroyed by convulsion, or gradually breathes his last in a state of stupor or exhaustion.

There is a milder form of this variety of yellow fever, in which, about the fifth or seventh day, the febrile process takes a different course. The pulse becomes stronger, fuller, and more distinct, the skin becomes warm, pervious, and at length perspirable, eruptions appear around the mouth, the foul fur of the tongue and teeth disappears, epigastric oppression goes off, the bowels are opened and discharge feculent stools, and the urine deposits more or less sediment. At the same time the patient experiences appetite for food, and is prone to sleep. If these favourable appearances continue, the disease has completely ceased; but if they are only temporary, which may happen, the febrile symptoms recur in general on the eighth and continue till the fourteenth, when they finally terminate by crisis similar to that already noticed, or may go on in a different form till the twenty-first, after which, it either terminates gradually in health, or exhausts the individual by long suffering.

In the fatal cases the appearances after death vary according to the violence and rapidity of the disease.

In the more severe and rapid cases, where death has taken place with convulsion or coma, the cerebral membranes are rarely reddened; patches of lymph are found on the free or arachnoid surface of the hard membrane, especially on the margins of the falciform portion. The substance of the brain is firm; and serous fluid is generally found in the cavities. When the course of the disease has been more tedious, lymph

is less frequently observed ; the free surfaces of the membranes are dry and lustreless ; the substance of the brain soft or flaccid sometimes liquescent ; the superficial veins distended with dark-coloured blood ; and the choroid plexus appears like a mass of clotted blood. The cavity of the heart and large vessels almost always contains the coagulating part of the blood detached from its colouring matter, moulded with more or less accuracy to their figure ; the venous blood is black and fluid. The abdominal peritoneum and omentum are generally dry, lustreless, and of a dark-grey or dusky colour ; the intestinal peritoneum dry, and of a faded green colour, and its superficial veins distended with black blood. Adhesions are said to be formed occasionally between corresponding parts of the abdominal and intestinal portion of the peritoneum, in the milder variety. The cavity of the stomach generally contains a soapy, dirty, or frothy fluid, with numerous flakes enveloping effused blood. The cavity of the intestines contains blood effused in different quantity in different parts. Its interior or mucous coat is sometimes loosened, but in general the structure is uninjured. The liver is said to be distended with adventitious matter ; by which appears to be meant that it is much distended or congested with venous blood. It is almost always soft and easily ruptured. The contents of the gall-bladder have been found thin and of a dirty colour, semifluid, and with an amber tinge, or thick, and with the consistence and colour of tar. The spleen is soft, flaccid, and easily or actually ruptured. The urinary bladder is generally shrunk, its cavity diminished, and its interior surface studded with clots of blood enveloped in shreds of mucous membrane.

C. The third modification of yellow fever occurs in the persons of those whose organic tissues are delicate in structure, whose muscles, especially those of involuntary motion, are easily thrown into action, and whose sensibility is great.

Nothing very characteristic is observed in the mode of attack ; but when the morbid process is established, the disease is attended with the following state of sensations and actions. The sharp darting pain which is felt through the whole head is often most severe in the forehead and temples. The skin, which is generally affected with a pungent and scorching heat, when examined by the hand, is dry and harsh, or irritable and seared

like a blighted or withered leaf, and either not at all or with difficulty affected by the usual irritants. The bowels are generally torpid and incapable of being moved by energetic medicines, or if affected at all give watery and non-feculent stools at irregular intervals. The urinary secretion is suppressed or suspended. The pulse is usually very quick, sharp and irritated, but never free, full, or strong. Life may terminate under the influence of this variety of fever, in two different modes. Either while the skin is dry and constricted, the bowels bound, and the urinary and other secretions suspended or checked, the patient may be cut off during the early period of the disorder by convulsion or slight coma; or, if he survive this season of the febrile commotion, till the skin is relaxed in a damp and unctuous but unhealthy moisture, he is destroyed by a gradual but certain process of colliquative discharge.

Dissections of this form of disease are not accurately recorded, or the reports present so much hypothesis blended with fact, that they cannot be implicitly relied on. The serous surfaces are said to have been unusually dry, and in some instances albuminous depositions have been observed on the surface of the brain, and the precordial part of the heart.

D. The fourth modification of yellow fever, which is also the last that I propose to notice particularly, is perhaps to be regarded as the most violent, the most unmanageable, and the most fatal of all the varieties of the disease. Its predominant character is oppression of the vital functions, and inadequacy to produce open or energetic febrile action.

Its peculiarities consist not so much in the mode of attack or the subject in whom it appears, as in the kind of symptoms, and the course which they observe. The pain of head with which it commences is quickly lost amidst the other sufferings in the general insensibility and listlessness of the patient. The countenance is dark, grim, and inanimate; the eye white, with a drunken senseless stare, at intervals confused and agitated. The mind is confused, the power of attention lost, and the speech incoherent; and this disturbance or annihilation of the train of thought is interrupted with occasional fits of furious raving. The skin is thick, dry, and insensible, rarely very hot; but the patient is distressed with painful sensations of internal burning. The tongue is smooth and livid-red, sometimes covered with foul whitish patches, always dry, and much swollen, so as to

prevent distinct articulation. The patient may be squeamish, yet rarely complains of it; but he always suffers much anguish and oppression at stomach, which eventually is attended with vomiting. The pulse, if quick, is irregular,—if slow, languid and oppressed. The breathing is much disordered, and performed with panting, gasping, or deep sighing.

The symptoms which have been now enumerated occur in the course of the first twelve hours; and, when very violent, that is, where confusion of thought, wildness or stupidity of aspect, incoherence of speech, or raving, indicate much disorder in the vessels of the brain, the patient may die apoplectic before the close of the first day. More frequently, however, at the end of twelve hours, a slight abatement takes place, when the symptoms are found to undergo some modification. The countenance is livid and glaring, the eye haggard, and with obvious diminution of the energy of general and particular sensation, the patient becomes extremely restless. The squeamishness of the early period is now succeeded or accompanied by retching and vomiting of matters swallowed and ropy fluids. The bowels generally discharge watery and non-feculent stools. The skin is chilled and unctuous, unless at the epigastric region, to which the patient refers a scorching heat with much tenderness. The raving which occurred at intervals becomes furious, and is aggravated by tremors and spasms, which about the third, or sometimes the fifth day, terminate in fatal convulsions.

If the disease do not terminate at this time, and in this manner, a different train of symptoms make their appearance. The countenance becomes torpid, death-like, and of a dirty waxy colour and aspect; the skin in general cold and unimpressible, and bluish-red, mahogany-coloured, or marbled; the hands, feet, and knees, are cold, tawny, and marbled; and appearances of extravasation (*ecchymosis*) take place in the skin and cellular membrane of the belly and scrotum, which become red, blue, and purple, accompanied with pain and tenderness. Blood oozes from the several cavities, especially from the surface of the intestines, and in some instances, though not so frequently it is said, dark-coloured fluids are vomited and discharged from the bowels during the last hours of existence. At the same time the pulse becomes quick, intermitting, and irregular, and finally ceases to be felt in the extremities; and death either

approaches gradually and insensibly, or takes place more suddenly in the form of convulsion, about the fourth, fifth, or sixth day, according to circumstances.

A milder form of this variety is slower in progress and less fatal in symptoms. Commencing nearly in the same manner, and with similar symptoms, it may terminate in death before the fifth day; but more commonly it continues in a straightforward course, but with occasional marks of abatement till the 7th day, when a stronger and freer action of the pulse, and a more uniform heat of skin, announce a change in the febrile process. This sometimes terminates in health with critical sweating and urine, and purulent collections in various parts of the body; but more frequently it goes on to the tenth or fourteenth day, and either disappears gradually, or amidst raving, convulsive motions, intermitting and ceasing pulse of the more remote arteries, life is gradually terminated.

In the fatal cases of this disease, which are numerous, the veins and sinuses of the head are generally filled with dark-coloured blood, the arteries in like manner are either empty or filled with fluid of this hue. The choroid plexus resembles a clot of black blood more than an organic part. The lungs are much gorged with fluid of the same qualities; in some instances they appear like a sponge filled with venous blood of the darkest colour; and in others they are firm and inelastic, of the same colour as the spleen. The mesenteric veins, or even the arteries, if not empty, the liver and its vessels, the spleen and its vessels, and most of the intestinal canal are darkened in the same manner. The interior of the intestine is generally filled with dark-coloured blood, fluid or half-coagulated,—the structure of the tube itself unaffected. The liver and spleen are generally increased in size, their substance softened, and easily or actually ruptured.

I have attempted the foregoing delineation of the external signs and characters of the various forms of fever which may be, or have been, considered by authors as that named yellow fever, that an unbiassed judgment may be formed of its nature without reference to nosological distinctions or hypothetical and preconceived opinions. It is probable that all physicians would not admit the several forms which I have now described as varieties of the same disease,—and perhaps more extensive experience, improved by more accurate observation,

will eventually define with greater accuracy the characters of this malady. But the information which has been collected by various authors, if to be trusted as evidence, shows that the varieties of disease now enumerated are allied, *1st*, in taking place under the same or similar circumstances of climate, local situation, &c.; *2d*, in appearing at the same or nearly the same season of the year, and generally with greater or less similarity of meteorological characters; *3d*, in being attended with a very similar train of morbid phenomena, that is, making allowance for varieties of constitution, situation of patients, treatment, &c.; and *4th*, in presenting morbid changes in several organs, very like, if not entirely the same, in the different forms of the disease.

The first variety, which is the genuine yellow fever of authors, as it occurs in the persons of young and robust male Europeans, who have recently arrived in the West Indies, America, or any other tropical region, consists of three periods or stages, the incipient or forming, the formed or proper, and the declining or concluding period. The first is known by the usual symptoms of constrained or struggling action of the vascular system, with the other phenomena which co-exist with this in the organs concerned in digestion, and in the brain. The second, which is separated from the first by an abatement, is distinguished by the violence and strength of the action of the heart, by great general heat, and suspension or disturbance of all the processes of secretion, &c. which depend on the healthy state of circulation. The third period is known by symptoms of organic destruction, especially among the small vessels, and by a course almost direct to subversion of all the vital functions to death. The duration of the first period is, in ordinary circumstances, about twelve hours, that of the second about thirty-six or forty-eight, and that of the third about twenty-four or thirty-six,—so that the duration of the whole disease, when it completes its full career, is at the least seventy-two hours, or three revolutions of twenty-four hours, at the most ninety-six or one hundred hours, or four complete revolutions, at the end of which, or about the beginning of the 5th day, death generally takes place.

The other three varieties agree in the common circumstance of presenting a form of morbid action less open and free. The actions of the vascular system are particularly oppressed; and

hence in neither of them are seen those symptoms of violent struggle and reaction observed in the first. The second variety alone presents a slight abatement at the close of the incipient stage; but after this, as in the third and fourth, the febrile process, which consists rather in an impairment or subversion than an increase of action, proceeds in a uniform tenor to the fatal result.

In the two latter varieties, vital action is extremely perverted, and its natural energy is nearly extinguished.

§. II.—ETIOLOGY OF YELLOW FEVER.

It is uncertain whether Yellow Fever prevailed among the indigenous inhabitants of the American continent previous to the period when it was visited by Europeans. From the testimony of Alzate and several Spanish authors, it appears, that long before the arrival of Cortez in Mexico, a disease named *matlazahuatl*, attended with hemorrhages from the nose and mouth, and extremely fatal, used occasionally to prevail epidemically among the native Mexicans, and was particularly mortal so early as 1545 and 1576, and afterwards raged epidemically in 1736 and 1737, and 1761 and 1762. Humboldt, indeed, maintains that this disease is totally different from the yellow fever, because it attacks the red or copper-coloured race, and is confined to the interior and elevated table-land of Mexico, at 1200 or 1300 toises = 7200—7800 feet above the level of the sea. This distinction is certainly by no means sufficient to justify the conclusion that it was distinct from yellow fever; and I think there is no doubt, from the facts adduced, that it was of the same nature, and differs only in presenting a more violent and concentrated character.

After the Europeans began to visit the shores of America, they became painfully familiar with this disease; and it is not improbable that it was the plague so often mentioned as attacking and destroying their forces on the various expeditions, military and naval, at the end of the fifteenth, and beginning of the sixteenth century, (1494—95—96, 1503, 1508, 1514.) It appears, from the testimony of Purchas, that a disease, bearing the general characters of yellow fever, had appeared in 1618 among the Indians of Narragansett and Penobscott in Massachusetts, and prevailed till 1622 with great mortality; and that, in the years

1619-20-21, it had committed great havoc among the European emigrants to Virginia.

One of the earliest distinct records of the disease which we possess is given by Echard, who informs us, that when the expedition against Hispaniola in 1655 under Venables returned to Jamaica, they met there "an enemy more severe than the Spaniards, which," he says, "was the plague, and which," he adds, "in a little time, reduced their army, originally 7000, to fewer than 2000 men." (Book iii. chap. ii. p. 717, folio, 1707, J. Hunter, p. 57, Moseley, p. 421.) It is impossible to admit this disease to be plague, which has never been known within the tropics; and concurrent evidence shows that it must have been yellow fever. The next record is found in the History of Barbadoes by Hughes (37), who states that Dr Gamble remembers that yellow fever was very fatal in the year 1691, when it was called the *New Distemper*, and afterwards *Kendal's Fever*, the *Pestilential Fever*, and the *Bilious Fever*; and he afterwards adds, that though it is most abundant and fatal in May, June, July, and August, among strangers, yet many inhabitants, in the year 1696, died of it, and great many at different periods since. In 1721 it again appeared in this island, and led Warren to undertake to show that it came from Martinique, and previously from Marseilles, where the plague had prevailed the same year; and when it appeared again in Barbadoes in 1733, he in like manner maintained that it proceeded from the same island,—statements from which it can be only inferred, that it was previously prevailing at Martinique. Towne, however, who wrote in 1726, had already admitted that the disease was endemial in the West Indies; and Hillary, who subsequently treated of the same subject in 1759, allowed that the disease had been frequently seen before in all the West Indian islands, without the possibility of tracing it to any medium of importation. The disease has since that time prevailed very often in all the West Indian islands, and, though sporadic every year between the months of May and October, every four or five years it occurs epidemically, and cuts off great numbers of the Europeans who have either recently arrived, or have not been long in the country. In May 1735, Dr John Hume saw it attack the crew of a ship of war at Barbadoes, and carry off great numbers of robust young men; and he states, that during his residence in Jamaica from 1739 to 1749, he does not remem-

ber one instance of a ship which remained four or five weeks in port, and which totally escaped the disease; and in 1741 and 1742, 11,800 were attacked, and 1653 died, or about one in seven of those sent to hospital; many more having died on ship-board. Among the troops, the sickness and mortality are in general still greater.*

According to the statements of Dr John Hunter, between the years 1779 and 1783, a space of less than four years, there were cut off among the European troops in Jamaica, 3500 men, chiefly from yellow fever, exclusive of those invalided from other diseases, and which might amount to 1750 more. (Observations, &c. p. 72.)

According to the testimony of Ulloa, the yellow fever was unknown at Carthagena, and all along the coast, till the year 1729, when it appeared among the crews of the *guarda costas* at St Martha, and committed dreadful havoc, and was particularly fatal to the seamen of the galleons under Pintado at Carthagena in 1730. There is, however, no doubt that it was the same disease which committed such mournful ravages in the squadron of Admiral Hosier, before the Bastimientos of Porto Bello in 1726, four years previous; and the fatality of the disease on this coast is proved by the fact, that galleons never remained any time without interring one-half, or at least one-third, of their men.

In 1740, it is said to have made its first appearance at Guayaquil, and to have repeatedly recurred since that time. In 1741, it appeared in the fleet of Vernon before Carthagena; and in 1742 it was again prevalent at Porto Bello. In all the towns on the coast of the American continent and islands, between the 45° north latitude, and the 10° south latitude, this disease has appeared in proportion as Europeans began to visit them numerically, for the purposes of war or commerce, and has presented a sporadic or epidemic character, according as the subjects were few or numerous. In this manner, Vera Cruz, Cumana, Havanna, Acapulco, and La Guayra, have successively become its endemial abodes; and its appearance in these towns is as uniform and certain as the arrival of the sun at the tropic of Cancer. Of these places, Vera Cruz and Havanna may be regarded as the nursery of yellow fever; and from the month

* Letters and Essays on several Diseases of the West Indies, by different Practitioners. 8vo. London, 1778.

of March, when the atmospheric temperature becomes intense, and the yellow fever commences, to that of September and of October, when the elevated temperature of July and August has attained its fullest intensity, this disease rages like a pestilence among the recently arrived Europeans, and those natives who descend from the elevated table-lands of the interior. Sporadic cases occur occasionally during the winter.

In North America, yellow fever was epidemic at Boston in 1693, and at Philadelphia and Charlestown two years after; at New York in 1702; in various parts of Virginia in 1737; at Norfolk in 1741 and in 1744; at Charlestown again in 1732, 1739, 1745, 1748, and 1768; and at Philadelphia again in 1751 and 1762.

In all these instances, it was, by the majority of those who observed the origin and progress of the disease, regarded as void of contagion; and, with the exception of Warren, Lining, and Lind, it appears to have been in all cases considered as a disease endemial to the country. Such at least was the sentiment of Towne, Hillary, Dr John Hume, Dale Ingram, Moultrie, Mackittrick, Dr John Hunter, Moseley, and more recently of Jackson, Fergusson, Musgrave, Wilson, and all those who have observed its progress with attention, and without prejudice. Dr Hume, who served in Barbadoes and Jamaica from 1735 to 1749, asserts, that we have undoubted proofs that the disorder is neither a plague nor contagious. (P. 238.) Moultrie, in like manner, who had seen the epidemics of Charlestown in 1732, 1745, and 1748, states, that he could not concur with those who believed it to be propagated by contagion, unless the atmosphere was at the same time disposed to produce the sickness; and adds, that in 1745, when it was very prevalent in South Carolina, it was evidently impossible to trace it to importation. Mr Dale Ingram, also, who practised in the island of Barbadoes about the same time, and witnessed the epidemic of 1748, denies entirely the influence of contagion, and undertakes to prove, that the disease, which was at that time an annual visitant of the island, depends on the intense solar heat operating on the wet or marshy coasts during the rainy season of July and August, and that, as the disease was always most prevalent after long tracts of dry weather, as in 1748, it depends on epidemic causes, and especially the continuance of heat and moisture. (P. 130.) The same views, we are told by Lind,

were entertained by Dr John Elliot, Mr Nasmyth, and many others, who had good opportunities of seeing the disease in Jamaica.

Dr John Hunter, who observed the disease from 1780 to 1783, considers yellow fever as an intense variety of the remittent endemial in the West Indies, from the fact, that yellowness neither occurs in all cases of the disease, nor is peculiar to the tropical epidemic, but is liable to take place both in intermittents and virulent jail fever, and is very common in the fevers of warm climates generally. He farther remarks, to prove its independence of contagion, that though three-fourths of the sick admitted in the military hospitals were labouring under fever, there was no reason to believe, that a man with any other complaint ever was attacked by fever in the hospital, nor was there any instance of fever with yellowness of the skin, proving more infectious than fever without that change in the colour of the surface.

Notwithstanding these strong testimonies, however, in favour of the spontaneous origin of the yellow fever, several maintained that it was both introduced and propagated by means of an infectious principle. Next to the unaccountable fancy that it was imported from Siam, Warren appears to have been the first who maintained that it was exactly plague imported from Marseilles into Martinique, and then into all the European colonies in the West Indies. This opinion was manifestly contradicted by the historical facts, since it was known, that the disease denominated yellow fever prevailed among the European visitors and settlers of the New World, in places and seasons in which there had been no communication with persons or vessels coming from ports in which the true inguinal plague of the Levant prevailed. Dr Lining, without adopting the idea of imported plague, regards it as an infectious disease; 1st, because it appeared in seasons of the most opposite meteorological characters; 2d, because almost all the nurses were attacked and destroyed by it; 3d, because it attacked first and preferably new-comers, who had never had the disease before, and country-people when they came to town; and 4th, because, whenever the disease appeared in Charlestown, it could always be traced to some person who had lately come from some of the West Indian islands. He nevertheless admits a fact which has been repeatedly confirmed by subsequent observers, viz. that if any from the coun-

try received the disease in town and sickened on their return home, the infection spread no farther, and did not even attack any one in the same house. This circumstance should certainly have induced Dr Lining to modify his confidence in the doctrine of infection.

Dr James Lind of Haslar Hospital was at the same period, though inclined to the opinion of Cleghorn, Moultrie and Hume, that yellow fever is merely a variety of remittent, led, from an instance in which the disease appeared in Philadelphia, after opening there a chest of clothes and linen belonging to a gentleman who had died of the disease at Barbadoes, to entertain the notion that, though often spontaneous and void of infectious properties, yet it becomes at other periods more virulent and highly infectious. This idea, however, does not appear to have attracted much attention till a much later period; and physicians were in general inclined to divide into the two parties of those who denied all infection in yellow fever, and those who always regarded the disease as such.

In 1791, Moseley maintained (*Dissert. Inaug. Lugd. Bat.*) the spontaneous origin of yellow fever, and, contending that it was a peculiar form of ardent fever (*causus*), corresponding to the *causus* of Hippocrates and Aretaeus, ascribes it chiefly to tropical peculiarities operating on European and unseasoned constitutions. This idea has been partly adopted by Valentin.

The doctrine of infection as a cause of yellow fever attracted, indeed, little attention till the year 1793, when the disease appeared with great virulence in the island of Granada, and subsequently in most of the Antilles, and in the course of the same season in Philadelphia, and many parts of the State of Pennsylvania, in Massachusetts, New York, in Carolina county Maryland, in Alexandria in Virginia, in several counties in North Carolina, and in Caraccas in Venezuela. The circumstance of the arrival of the Hankey, a vessel from Bulam, on the West African coast, on the 19th February 1793, in St George's Bay, some days before the general appearance of fever in Granada, led Dr Chisholm to infer that the disease which thus appeared was imported by that vessel, in which, indeed, when stationed off Bulam, fever had prevailed about five months before to a great and fatal extent. Dr Chisholm further maintained, that the disease thus generated and imported was a new pestilential disease, unheard of before in the West Indies, en-

tirely different from yellow fever and malignant pestilential fever, and to which, consequently, he specially applied the name of Bulam fever. The whole of this, however, originated in misstatements of facts, and complete ignorance of the previous history of the West India fevers.

1. It is certain that the fever which in July 1792 attacked the colonists and crew of the Hankey when stationed at Bulam in the Rio Grande was the remittent common to the West African coast; and it may be regarded as a certain fact, that the only reason why it attacked and destroyed a large proportion, was, that the febrific causes, at all times in operation in the island, had now subjects on which to operate, and that these subjects were exposed to the influence of the febrific causes at the very season at which they are most energetic.

2. Whatever was the nature of the fever which attacked the Bulam colonists, it is evident that it originated from physical, local, and meteorological causes; and, while it was well ascertained that the remittent was not infectious, and that the Hankey arrived in the West Indies perfectly healthy, the hypothesis of Dr Chisholm leads to one of two alternatives, either that remittent fever is infectious, or that the disease which appeared in Granada soon after the arrival of that vessel was not derived either from her or from any person on board.

3. It may farther be argued, in opposition to the opinion that the yellow fever of 1793 was imported into the West Indian islands, that it had not only appeared in these islands repeatedly before, but appeared on this occasion in too many islands, within too irregular intervals to suppose that contagion had any thing to do with the visitation. Thus, while the disease appeared in Granada carenage about the commencement of March, and soon after at St Vincents, it did not appear in Dominica till the 15th of June, and then only among the numerous emigrants from Martinique who had arrived on the 10th, and who thus crowded an already dense population. Yet fever had not before this attacked the inhabitants of the island of Martinique, nor were the emigrants sickly at the period of their arrival. A few weeks after this it appeared in Antigua, and the rest of the Leeward Islands; and all suffered its ravages during the autumnal months. In Jamaica and St Domingo, it appeared so nearly at the same time that the possibility of importation was out of the question.

4. It may therefore be regarded as certain, that the disease which was thus by a degree of ignorance and misapprehension almost unrivalled in the history of medicine, then and since denominated *Bulam* fever, was only the usual form of fever common in certain seasons to the whole of the West India islands, and which has prevailed there chiefly among the newly arrived or not long-resident Europeans ever since commercial intercourse has been fully established between Europe and these islands. It would, indeed, have been as accurate to apply the names of Bristol or Liverpool fever to West India fever, appearing after the arrival of vessels from either of these ports, and to regard them as new, peculiar and distinct diseases, as to designate any form of yellow fever by the name of *Bulam*.

5. It is, nevertheless, satisfactory to observe, that this fancy of yellow fever being imported from the west coast of Africa into the West Indies, though maintained by Dr Chisholm, Sir William Pym, and some others, was, after much deliberate investigation, rejected by the most accurate European observers, as Volney and Humboldt, and all the most intelligent American and West Indian practitioners, as Caldwell, Rush, Webster, Maclean, Jackson, Borland, Miller, Lempriere, Fergusson, Dickinson, and Wilson. The opinion maintained by Dr Chisholm, that it was a new disease different from yellow fever, as long observed in the West Indies, is unquestionably a point of individual observation. But it must be observed in opposition to this opinion, that of all the physicians who afterwards saw and described this epidemic, and who have since seen it in different places and seasons, none were able to recognize any distinction between it and yellow fever, as it is described previous to 1793.

Since the year 1793, yellow fever has very often appeared in the West India islands and the cities of the American Union epidemically, and has even been epidemic in various parts of the south of Europe. Without adverting to Vera Cruz or Havana, from which it can never be said to be absent when there are suitable subjects, it appeared in 1794 in Cuba, Charlestown, Newhaven, Baltimore, Philadelphia; in Charlestown it recurred every year from 1794 to 1801, except 1798; in Philadelphia it prevailed in different degrees in 1794, 1796, 1798, and 1801 and 1802; and in Martinique, besides 1796, it continued to prevail every year from 1802 to 1809, inclusive. From Charlestown it disappeared between 1801 and 1807, and again

between 1807 and 1817, when it prevailed to some extent, disappeared in 1818, and recurred in 1819. In Philadelphia it appears to have ceased since 1802; in New York it had a period of quiescence from 1802 to 1819; and in Martinique from 1809 to 1819.

Yellow fever, however, has not been confined in its attacks to the West India islands or the coasts of the American continent. If it be doubtful whether it were yellow fever that appeared at Cadiz in 1705, it is quite certain that it appeared in that city in 1730, and again in 1764, when it is said to have destroyed 100 persons daily at an average.* In 1741, an epidemic fever, with black vomiting, took place in Malaga in the south of Spain, and is said to have destroyed more than 10,000 persons. For a long series of years after 1764, no sickness appeared in the south of Spain of sufficiently general character to merit the name of epidemic, though bilious remittents are frequent and endemial. In 1799 a fever, similar to the yellow fever of the West Indies, prevailed in Gibraltar; and in 1800, the mortality of the garrison was very high. In 1800, however, the disease appeared once more in Cadiz, and also in Seville, Ile de Leon, Xeres, Santa Maria, San Lucar, Port Royal, Chiclana, Rota, and Carthagenas, and next year in Medina Sidonia. In these several places it was estimated to have destroyed 79,500 persons, in a population of 279,560. In 1802 the towns of Spain were entirely exempt from this disorder; but in the month of July 1803, it appeared in Malaga, and before December, when it subsided, it attacked 26,500 in a population of 48,000, and destroyed 6884.

The following year, 1804, was still more signalized by sickness. Yellow fever appeared in Malaga in June, and before terminating in September, it was said to have attacked 18,552, and to have cut off 7726 persons. It prevailed also in Antiquera, Rambla, Montilla, Espejo, Carthagenas, Ronda, Vera, and Alicante; and it was in this year that the presence of yellow fever was first formally recognized in Gibraltar; and before it ceased it destroyed 5946 persons. The same year the disease was very prevalent and fatal in Leghorn; and it appears to have, about this time, also prevailed in the island of Corfu.

Several years of health ensued, till 1810, when yellow fever

appeared in Cadiz, and, less generally, in Gibraltar. But it reappeared in this town in 1813 and 1814; in 1820 in Cadiz and Xerez de la Frontera, and again in 1828 at Gibraltar.

It has been repeatedly asserted by those who maintain the West India origin of yellow fever, that it has never been known, and never occurs, in the East Indies. This, however, is a complete mistake. Independent of the fact, that very violent and rapidly fatal fevers, with yellowness of surface and black vomit, and intestinal discharges, have been long known to occur at Calcutta and Culpee on the Ganges, in Batavia and Java, we have the direct testimony of Dr Nicholl to prove that, in the hot months of summer and autumn, the endemial fever of Seringapatam assumes, in the persons of European soldiers and civilians, the usual characters of yellow fever. Mr H. Marshall informs us that fever, which was no way to be distinguished from the yellow fever of the West Indies, was repeatedly observed in the British troops stationed at Trincomalee and Ceylon; and we know, from the recent experience of the campaigns in the kingdom of Ava, especially at Rangoon, at Arracan, and along the banks of the Irrawaddy, that Europeans are liable to be attacked with a fever which presents all the essential characters of yellow fever.* Mr Stevenson, indeed, though he admits the resemblance between the fever of Arracan and the concentrated endemic of the West India islands, follows Dr Chisholm and Sir William Pym in distinguishing the latter from the Bulam fever. As I have already shown that this distinction, attempted to be maintained by Dr Chisholm and Sir William Pym, is completely gratuitous and at variance with the historical facts of the case, it is unnecessary to admit its influence in the present instance; and we must adopt the conclusion, that occasionally the East India soil and climate produce on European constitutions a fever quite similar to the endemic virulent sickness of the West Indies.

The testimonies of Lind, Hume, Schotte, Winterbottom, and Boyle, show indisputably that a fever, in its essential characters of symptoms, progress, and virulence, the same as the yellow fever of the West India islands, prevails endemially along the west coast of Africa, at Senegal, Sierra Leone, Cape Coast

* Burnard's Sketch of the Medical Topography of Arracan, Transactions of Calcutta Society, Vol. iii. p. 34; Stevenson's Remarks on the Sickness which prevailed at Arracan in 1825, *Ibid.* p. 112; and Dr Waddel on the Diseases among the Troops at Rangoon, p. 420.

Castle, and the islands of Fernando Po and St Thomas, and in certain years acquires epidemic characters. Thus the epidemic of Catcheo and Cape Coast Castle, mentioned by Lind in 1755, that of Senegambia, seen by Schotte in 1766, 1775, and 1778, and those described by Boyle in 1823 and 1829 at Sierra Leone, were manifestly of the same general characters as the yellow fever of the Antilles. In short, endemial fever, occasionally assuming an epidemic character, appears to be the disease of all hot climates and warm seasons in every part of the globe, and its virulence depends on the facility with which it finds fit subjects.

In all these instances much difference of opinion has existed as to the source of the disease and the manner in which it was propagated. By one party it is represented to be, in all instances, of foreign origin, and to appear solely in consequence of having been imported from some of the ports of the West Indies, or Spanish America, as Vera Cruz or Havanna. Another party maintain that yellow fever, wherever occurring, whether in the West Indies, in the United States, or in the south of Europe, is invariably of domestic origin,—is merely an intense and virulent form of the endemic of the country during summer and autumn, and never produces itself, or is communicable by contagion. It would much exceed the limits of a treatise like the present, were I here to enter minutely into the consideration of the question of the origin and propagation of yellow fever; but it is necessary to adduce some of the most important facts and arguments, or both, in order to place the matter in its just light.

It may be admitted as an established fact, that the intense and virulent form of fever designated yellow fever or black vomit, is the spontaneous product of the coasts of the West India islands and the American equinoctial continent. This inference results immediately from the history of yellow fever, which shows that this disease has been known in these latitudes ever since the period when European intercourse became frequent and habitual. Thus, all over the Archipelago of the Caribbean Sea, the disease takes place sporadically or in insulated cases every season, more or less numerous, according to the subjects and the number of new visitors; and there never is a season in any of the inhabited places, in which a few cases, which cannot be distinguished from yellow fever, do not occur.

The same circumstance is still more forcibly observed at Vera Cruz, Havanna, and other towns on the Spanish Main, in which yellow fever invariably attacks Europeans or North Americans, who land between the months of May or June, and October or November. But though in these places scarcely a season passes without one or more, or even several, cases of yellow fever occurring, so long as they do not affect many of the population,—so long as they continue few, insulated, or sporadic,—they attract no attention, and we consequently hear nothing of the disease in ordinary years.

We find, however, that in certain places, and in certain seasons, yellow fever is more peculiarly prevalent than in others. Thus the islands of Martinique and Guadaloupe, in the West Indies, have been more frequently the seat of yellow fever during the last century and a-half than any other of the Antilles; and Charlestown and Philadelphia have been more frequently affected than the other towns of the American union. Yellow fever has been twenty-two times epidemic in Martinique between 1669 and 1819; and sixteen times in Charlestown between 1700 and 1819; and it must be inferred, that there are in the meteorological and local peculiarities of these places several circumstances which dispose to the frequent occurrence of this disorder. Martinique, indeed, presents nothing peculiar or different from that of the other islands in the Caribbean Sea, except great dryness and heat; and Charlestown, which is situate on the narrow peninsula formed by the confluence of the broad and deep Ashley and Cooper rivers, is simply, like all other towns, situate on the sea or river coast of alluvial countries in warm climates; that is, while the alluvial banks of the river are liable to occasional alternate periods of inundation and desiccation, the fluctuations of the tides co-operating with these, contribute powerfully, under intense solar heat and a windless atmosphere, to render the shores of Charlestown the seat of miasmatic exhalations and fevers. The intense solar heat in this city is demonstrated by the fact mentioned by Moultrie, that in the months of July and August, the thermometer in the shade indicates a temperature of 92° and 93°; and that in the year 1768, when the yellow fever was very violent, the thermometrical indications varied in the month of August from 97° to 98° in the shade.

It is natural to consider the circumstances which chiefly dis-

pose to the production of this disease in these places and seasons; and as these circumstances seem numerous and complicated, it is only by the separate consideration of each that their influence individually or conjointly can be well understood. They may be conveniently referred to the following heads,—1st, the degree of atmospherical temperature; 2^d, the state of the atmosphere as to currents or winds and electricity; 3^d, the local peculiarities of the surface; and 4th, the constitutional susceptibility of the inhabitants.

1. It appears that intense solar heat contributes very powerfully to the developement of yellow fever. When we consider all the places in which fever has most frequently occurred, we find that it has prevailed chiefly in places situate between the tenth degree of south latitude, and the forty-second degree of north latitude. The limit of its known occurrence in the southern tropics is Olinda in Brazil in 9° S. lat. where it appeared in 1687, and continued more or less violently each year till 1694. The limits of its occurrence in the northern hemisphere are Portsmouth in the United States in 43° N. lat. and Boston in 42°. On the continent of Europe, it has generally prevailed in places situate between the 36° and 38° north latitude, and has never gone further north than Barcelona, in north latitude 41°. It was reported, indeed, to have appeared in 1813 in Kamschatka, north latitude 60°; but there is reason to question the authenticity of this statement. It is remarkable that this disease should have proceeded so little in the southern, and so far in the northern hemisphere.

From the generally admitted fact of the high atmospheric temperature of places and seasons in which yellow fever is either endemial or becomes epidemic, it has been inferred as a general principle, that yellow fever is not formed, and cannot exist, unless when a certain very high range of average temperature is observed; and Sir Gilbert Blane particularly has conceived himself justified in establishing it as a rule, that it never appears either in tropical climates or in the temperate latitudes, unless when the atmospheric heat has been for some time steadily at or above 80° of Fahrenheit, or 21 of Reaumur, or 26.67 Centigrade. This conclusion states the febriferous temperature of the atmosphere rather too high. According to the observations of Humboldt, yellow fever begins to rage epidemically at Vera Cruz as soon as the medium atmospheric tem-

perature of the month attains the 24° of the Centigrade, or 75.2° of Fahrenheit's thermometer. This takes place in this sea-port, N. lat. $19^{\circ} 11'$, in the month of March, when the epidemic disease begins to show its power. Yet it is further to be remarked, that though May is at Vera Cruz hotter than September and October, it is chiefly in the latter months that the ravages of the disease are most comprehensive and irresistible,—a circumstance which depends on the fact, that the efficient causes, whatever they be, require some time to attain their highest degree of energy. From June to September the temperature is rarely below 28.7° Cent. that is, 83.66° Fahrenheit. In December, January, and February, when the temperature is steadily below 74° or 75° , and the north winds often occasion a sensible chilling, the endemial fever subsides, and most usually disappears entirely, or rather loses its epidemic character. It is hence that Europeans, who are apprehensive of yellow fever, consider as most salubrious those years when the north wind blows vigorously till the month of March, and when it begins again to display its influence in the month of September.

The port of La Guayra (N. lat. $10\frac{1}{2}^{\circ}$,) affords a similar illustration of the same fact. With a mean temperature of 31.6° Cent. = 88.88 Fah. from 17th June to 16th November, and the temperature of the hottest month at $29.3 = 84.74^{\circ}$ F. yellow fever prevails almost annually, attacking all, and destroying many, of those Europeans or North Americans who visit its shores. From the 16th November to 19th December, the mean temperature of noon is $24.3 = 75^{\circ}$ Fah.; and in January and February it rarely falls below 21° , a circumstance which Humboldt thinks may make it be dreaded that yellow fever will now prevail the whole season round at this place. This apprehension, however, is quite groundless.

To the same head is to be referred the fact, that, though yellow fever prevails on the coast and in low situations, it diminishes as we ascend, and is unknown in mountainous situations. In the intendency of Vera Cruz, the yellow fever, which rages in the capital, has never been able to ascend above the farm of Encero, which Humboldt found to be 3044 feet above the level of the sea; and, as the Mexican oaks do not flourish below this limit, it shows that the constant average temperature is of a true tropical character. The same author observes, that, while yellow fever rages at La Guayra, it never crosses the Cumbre and the Cerro de Avila, a mountainous ridge which

separates that part from the valley of Caraccas, and the elevation of which exceeds a little that of the Encero.

At inferior elevations even in the West India islands yellow fever is observed to cease ; and we rarely find it exerting its strength at 1600 feet above the level of the sea in Jamaica, or any of the Antilles. In Jamaica the medium temperature of Spanish Town in the hottest months is about 85° F. or between 83° and 85° ; and in Kingston it is much the same, ranging from 85° to 90° , and rarely falling below 80° , from May to the end of September. At the more elevated parts, however, the temperature diminishes, being only about 70° at Stoney Hill, elevated about 1300 feet ; at Cold Spring, 4200 feet above the level of the sea, only 60° ; and at the summit of the Blue Mountains, which are estimated to be 7200 feet above the level of the sea, the thermometer is found to range in August from 47° at sunrise to 58° (Hunter) at noon, or at an average 60° . (Moseley.)

At Stoney Hill, the first of these places, yellow fever has sometimes, though not very often, displayed its epidemic virulence in a very bad form ; but it has never been known much higher than this point, whether from the want of subjects, or the low temperature and free ventilation.

In the island of Trinidad, however, the ridge behind Port of Spain, which is a limestone rock, elevated 1500 feet above the level of the sea, has been highly productive of yellow fever, and has cost the lives of many men in attempting its clearing and fortification.

But even at elevations much less yellow fever is not capable of existing. Thus the outer Cabritt at Prince Rupert's Head in Dominica, which is only 600 feet above the level of the sea, is comparatively cool, pleasant, and healthy ; and Daxon's Hill, which is 1010 feet,—One Tree Hill, which is 1300,—and Mount Pleasant, which is 1360, are very salubrious stations, and totally free from this disease.

Though these facts are well established, it is nevertheless certain that the continuance of a temperature above 75° or 80° does not in all places produce yellow fever ; and conversely, it appears that yellow fever may exist in years when the temperature is not absolutely at the highest point.

Thus it appears that in Granada in 1784, though the thermometer was never below 82° , and was generally as high as 86° or 87° in May, June, July, and August, and in May, June,

and July of 1785, never below 81° , and often 86° and 87° , yet yellow fever, if known in that island during that season, was not epidemic or general. Nay, in September 1786, when it was never below 84° ,—when three days it was at 88° , fifteen days at 89° , and six days at 90° ,—and the heat was so intense and enduring that persons who had spent forty years in the West India islands could not remember weather so remarkable for heat,—no notice of yellow fever, either sporadic or general, is mentioned. It is further remarkable that, while the lowest temperature of the month of April and August in 1792 in Granada was 78° , the lowest of May 79° , and the lowest of June and July 77° , the lowest of April 1784 was 81° , the lowest of May and July 82° , and the lowest of June and August 84° ; and it was only in June and July 1786 that the thermometer was so low as 77° and 76° . Yet in the former year yellow fever was epidemic and fatal; in the latter seasons, if a few cases occurred, they attracted no notice.

It is impossible to doubt that the same high temperature must have been observed in others of the Antilles without giving rise to yellow fever in its epidemic shape. In various parts of the Mediterranean, also, especially on the coast of Africa, and in several of the East India cities, the temperature rises to 80° , 85° , and 90° , yet without producing proper yellow fever. (Smyrna, Aleppo, St Jean D'Acre, Goa, Mauritania, Egypt.) In Canada, where the temperature is every summer from 90° to 96° , yellow fever has never been known.

Conversely, I have to observe that yellow fever has been several times known to prevail when the temperature was beneath 80° F., and in several seasons in which it has prevailed epidemically, the atmospheric temperature has been less elevated than in seasons in which it did not become epidemic.

It is thus remarkable that in the epidemic which prevailed in Philadelphia in 1797, and in the months of August, September, and October, cut off nearly 1100 persons, the thermometer was never during the whole of August above 79° , and this it attained only one day (the 5th,) being generally 74° , 75° , or 76° ; in September it was 80° , only in two days, the first and second, being all the rest of the month never above 74° , and much more frequently varying from 60° or 63° to 65° , and in October it never was above 70° . (Rush, Observ. and Inq. iv. p. 7–9.)

We observe the same results nearly in Europe. From the meteorological observations of Arejula in the years preceding the epidemic of Cadiz in 1800, and of that year itself, it appears that 1800, during which yellow fever was epidemic, was not the year most remarkable either for the intensity or the duration of atmospherical heat. In 1800 the thermometer rose to 87° on the 19th August, whereas in 1790 it rose to 90° on the 27th July, while in 1791, 92, and 94, it was 86.05° , and 85 respectively, without producing yellow fever. The disease also took place at Gibraltar in 1813, when the thermometer was below 70° .

These facts are quite sufficient to prove that the highest degrees of atmospherical or terrestrial temperature are not necessarily conjoined with the production of yellow fever, and that, though this disease requires a temperature of 74° or 75° for its production, its continuance is quite independent of this temperature. This principle is still more remarkably evinced in the yellow fever of Philadelphia in 1793. Though the thermometer, which had begun to rise in the months of May and June to 82° , 88° , and 90° , remained steadily above 80° the whole time of July and August, except one day in the former month and five in the latter, yet the disease did not appear distinctly and unequivocally till the 1st of August, during the first three weeks of which the weather is said to have been temperate and pleasant; whereas in September, when the attacks and deaths were very numerous, the thermometer was seventeen days below 80° , three days at 80° , only one at 89° , and all the others, excepting three not specified, under 87° ; and in October, when by far the greatest number of deaths took place, the thermometer was only once at 80° , once at 76° , twice at 74° , four times at 72° , once at 71° , at 70° , 69° , and 68° , three times at 66° , and all the other days below this down to 49° , 44° , and 37° .

From these facts it irresistibly results, I conceive, that high temperature, or intense and continued atmospherical heat, is not the most essential generating cause of yellow fever, and that this requires the concurrence of some other circumstances. It appears, in short, that elevated temperature is merely one of many coexisting circumstances which concur at the period of yellow fever epidemics, and which, in all probability, are to be referred to the operation of some more general cause.

It is indeed a remarkable fact, that previous to the year 1793, a degree of immunity pretty general had been enjoyed by most of the West India colonies and the towns of the United States for the space of at least ten years. From the year 1770, when the disease appeared in Martinique, till 1782, when some cases occurred in several of the vessels of the fleet of Lord Rodney, West India fever did not assume an epidemic character. That the usual proportion of cases, however, continued to take place among the troops in Jamaica, appears from the testimony of Jackson, who saw several fatal ones between 1774 and 1782, and that of Hunter, who shows that between 1779 and 1783, 3500 men died, of at least 7000 sent thither. No general or epidemic sickness, however, appears to have taken place till 1791, when several cases occurred in Jamaica and New York. In 1792 the disease appeared in Charlestown. Its general prevalence in 1793 indicates that in particular seasons certain peculiarities, probably meteorological, concur to the production of this disease more effectually and powerfully than in others.

2d. It is difficult, in the absence of positive observations, to specify the exact circumstances which seem most essential to this occurrence of yellow fever. But the circumstance which appears to be most general is that of a calm, windless state of the atmosphere, preceded often by an unusual train of weather in the particular place. Thus it is observed in the West India islands, that seasons in which there is the usual complement of fresh winds, gales, hurricanes, and tornadoes, are by far the most free from sickness, and in periods of epidemic disease the occurrence of a hard gale or tornado very generally puts a stop to the attacks and mortality. All the seasons, on the contrary, which have been remarkable for sickliness, have been equally remarkable for the long continuance of calm weather, the lightness and occasionally the total absence of the winds.

It is by no means improbable that the state of the atmosphere, as to its electrical susceptibility, has considerable influence in tropical and warm countries on its febrific properties. We know that in ordinary circumstances the positive and negative electricities are exactly balanced, but that at certain periods, especially when the sun approaches the meridian of any given place, this equilibrium is subverted; and in order to restore it, not only thunder storms, but often violent hurricanes and torrents of rain take place. As, previous to these explosions there is reason to believe that positive electricity is slowly and

gradually accumulated in the atmosphere, until it exceeds the negative, it appears to be during this accumulation that the atmosphere acquires that condition, whatever it may be, which favours the production of the disease. It is not necessary to suppose that this process of accumulation is a mere hypothetical assumption. It is the generalized expression of many facts derived from all meteorological observation. It may or may not be necessarily connected with the production of epidemic disease; for this can only be determined by observation. But it is proper to be aware, that the recorded histories of all the most important epidemics, as given by Webster from many different sources, Ozanam, and others, show clearly that previous to their appearance, and during their prevalence, various meteorological phenomena took place indicative of a great and unusual accumulation of electric matter in the atmosphere. On this point, however, we require many precise observations.

3d. It nevertheless becomes a matter of inquiry, by what means the elevated temperature, admitting its existence, the windless state of the atmosphere, and its electrical supersaturation, concur in the production of yellow fever. In explaining this circumstance, many physicians have had recourse to the influence of marshy exhalations, or *malaria*, and have regarded yellow fever as merely the highest and most intense form of the disease, generated by solar heat from a marshy surface, or situations similar to marsh. On this point it appears to be well established, by the testimony of Dr John Hunter, Moseley, Jackson, Humboldt, Volney, Maclean, Fergusson, and many others, that low marshy districts on the sea coast are quite capable of producing yellow fever in all its virulence. It is also well known that the banks and outlets of rivers into the sea, and the sea coast itself, are in the tropical regions, and in the summer and autumn of warm countries, more or less productive of yellow fever.

The principal arguments which may be adduced in favour of this view are the following. Yellow fever is observed to take place sporadically or epidemically in the summer and autumnal months in the same places in which agues and remittents prevail in the spring and summer. Thus Cleghorn observed in Minorca fevers of the continuous remittent character, with progress so rapid, and symptoms so intense, terminating in yellowness of the surface, and black vomiting and purging, that no distinction could be drawn between them and the yellow

fever of the West Indies. The *Nedad* of Abyssinia described by Bruce is a variety of yellow fever. Volney informs us that in Sardinia similar fevers take place; and there is no doubt, from the testimony of Irvine, Burnett, Boyle, and Hennen, that, under certain circumstances, in very dry windless seasons, fevers of the same character take place among the soldiers and sailors in the Mediterranean. All over the West Indies and United States, in like manner, wherever there are marshy coasts and banks, and situations favourable to the production of ague and remittent, cases of yellow fever are observed to occur. The same concurrence is observed in the East Indies, and has very forcibly been impressed on our colonists in Sierra Leone and the neighbouring coast in 1823 and 1829. (Boyle.)

It has been also repeatedly observed in situations of the kind now mentioned, that agues and remittent fevers very frequently, in certain seasons, assume the characters of yellow fever; and that cases which experienced judges could not distinguish from yellow fever, occasionally terminated in ague, or distinct remittent. Thus it has been observed, that in certain seasons the remittent of the Mediterranean assumes the usual appearances, observes the rapid course, and proceeds occasionally to the fatal termination of the genuine West India yellow fever; and it is by no means uncommon to see persons resident in the same place attacked, some with common ague or remittent, others with yellow fever. It appears, also, from the testimony of Hunter, Volney, Maclean, Miller, Humboldt, Jackson, Pinkard, and Fergusson, that instances of yellow fever in the West Indies and United States occasionally terminate in fits of ague. The lake fever, and break-bone fever of the United States, which is certainly the endemic of the country, occur in conjunction with cases of genuine yellow fever, terminate in it, and have been known to follow fever similar in all respects to yellow fever.

It is not, however, from their marshy character simply that these situations derive this febrific property. It has been shown by Dr Fergusson, as already-mentioned, when speaking of ague and remittent, that it is chiefly the desiccating process which gives rise to fever; and it must be added, as an indispensable condition, that it is desiccation by mere solar heat, unaided by wind, that is the most powerfully productive of the peculiar poison which produces in the economy this degree and kind of disorder. All the facts hitherto collected on this

subject show, that a more concentrated and energetic form of the same cause which produces ague and remittent is adequate to produce yellow fever. This concentration and energy is further most certainly acquired under the operation of long-continued solar heat, with an undisturbed state of the atmosphere operating on the sea coast or banks of rivers.

The nature of the soil and subsoil, or the composition of the terrestrial surface, has been believed, not without reason, to exercise considerable influence on the production of yellow fever. On this subject, however, the facts are discordant, and the results not easily reconcilable.

a. That the alluvial mould along the sea-coast, and especially at the outlets and along the banks of rivers, are fertile sources of the poisonous miasm which produces yellow fever, is abundantly proved by the examples of Granada, St Domingo, New Orleans, Pensacola, Philadelphia, New York, and Boston, the soil round all which is level, flat, and alluvial. But it is also certain that this is not the only source of this cause of disease, and that these alluvial tracts do not always produce it. Most of the West India islands in which it has prevailed, most frequently present a calcareous basis covered with much loose mould. Such, for instance, is the case with the plain of Liguanea in Jamaica, which is very often the seat of yellow fever. (Moseley, Jackson, Fergusson, and Wilson.)

Most of these places, however, it is to be observed, present more or less of a beach, bank, quay, or wharf, alternately immersed in sea water, and exposed to solar desiccation of considerable intensity; and it is further to be observed, that it has always been near the beach, or wharves, or in harbours, that the first cases of yellow fever have appeared, and that the disease has betrayed its most virulent character, both in symptoms and mortality. Thus the first cases at Granada occurred among the sailors in St George's carenage; the first and the greatest number of cases in New York have generally appeared in Water Street, Pine Street, and Wall Street; and the greatest number in Philadelphia in Water Street, and along the wharves in that city. It is impossible to deny that these wharves, which are constructed chiefly of logs of wood, often not well united, afford receptacles for all sorts of animal and vegetable matter, in a very filthy and putrid condition, which may possibly favour the operation of disease. Has the dis-

ease ever occurred in ports provided with substantial well-constructed stone quays?

It must be observed, however, that even periods when the docks and wharves of sea-ports have been remarkable for filth, are not also equally remarkable for sickness. The wharves of Granada, New York, Philadelphia, and many other places, had been quite as filthy for years previous to 1793 and 1797, without giving rise to yellow fever, as in that year when the disease actually appeared; and it is remarked by Humboldt, that Vera Cruz was less clean previous to 1793 than subsequently to 1800, yet without giving rise to yellow fever epidemically before, and without suppressing its appearance afterwards.

b. The occurrence of yellow fever epidemics has been repeatedly ascribed to the elementary decomposition of vegetable substances, in the course of which, it is believed, some gaseous products are evolved, which prove highly deleterious to the animal frame. Thus yellow fever epidemics at New York and Philadelphia have been ascribed to the decomposition of large masses of wet, damaged, and corrupted coffee; that of Gibraltar has been ascribed to masses of putrid cabbages, and other vegetable matter; and on ship-board, sporadic cases have been attributed to bilge-water, that is, water containing vegeto-animal matter in a state of decomposition, to wine-lees, and other substances of similar composition and effects. The whole of these causes, it may be remarked, are of operation entirely local and temporary, and seem quite inadequate to produce the effect. The fact of their existence, nevertheless, at the commencement of epidemics, demonstrates the prevalence of a peculiar state of the atmosphere, which favours not only the rapid decomposition of animal and vegetable substances, but the production of epidemic sickness.

c. One situation productive of yellow fever has of late years attracted much attention. In many instances, vessels on the West Indian station, and in some vessels on the West African station, have become for one or two seasons the seat of yellow fever whenever they were near the coast; and the only mode in which they have been able to protect their crew, is by putting immediately to sea. In cases of this description, it had been customary to ascribe the fever to the miasmatic exhalations evolved from the vegeto-animal matter of the ballast, or

from the bilge-water contained in the well and hold. In several recent instances, however, particularly those of the *Iphigenia* in 1820, the *Rattlesnake* and the *Isis* in 1824, and the *Pylades*, *Ferret*, and *Scylla* in 1825, these causes of fever could not be recognized, since that from the ballast was obviated by the use of cast-iron ballast; and, in the instances of the *Iphigenia* and *Rattlesnake*, the water in the well was frequently renewed, and both vessels were found particularly clean and well-aired. Mr Wilson, after minute examination and comparison of these vessels with others, finds that most of them are built of new timber, rather green, which, upon coming into the tropical regions, suddenly begins to undergo a peculiar species of decomposition, during which, he conceives, gaseous products are emitted, and after which the timber of the vessels becomes dark-coloured, as if charred, shrinks in size, and becomes denser and more compact than before. This change, Mr Wilson further observes, is quite different from that which is known by the name of dry-rot,—in this respect, that the ligneous fibre is not injured, and is merely consolidated. From these facts, combined with others derived from the structure of the piers, wharves, and quays in the West Indies and United States, Mr Wilson attributes the origin of yellow fever to the decomposition of wood.

d. A peculiarity in the soil, as connected with its vegetable products, which has been supposed very efficient in the production of yellow fever, may be conveniently mentioned under this head. This consists in the forests of mangroves, with which the sea-coasts, and river-mouths, and banks abound in tropical countries. The connection of this rapidly growing and rapidly wasting plant with endemic fever was early recognized by Dale Ingram, who had considered the origin of yellow fever with some care. Their influence, however, appears to have been overlooked or forgotten, till Humboldt, in 1800, again directed the attention of physicians to this subject, and after whom their effects were also examined by Wilson in 1827. From the observations made by these authors, it results that the alternate rapid growth and decay of the mangrove is accompanied with the production of exhalations, which they conceive highly deleterious and febriferous. The thickly tangled roots and branches of these plants form an impenetrable forest, in the recesses of which numerous fish, molluscous productions, and other animal matters, are in a process of constant

growth, decay, death, and decomposition; and the exhalations emanating from these, with those emitted from the dead vegetable matter, are conceived to be extremely liable to produce fever. Humboldt and Mr Wilson, indeed, take different views of the mode in which mangrove forests operate in generating yellow fever,—the former ascribing the disease to the effluvia evolved during decomposition of the multitudinous *mollusca* and vermin with which their interstices abound,—while the latter attributes it to the alternate growth, decay, and decomposition which the mangroves themselves undergo, and conceives the fact illustrates his hypothesis of the ligneous origin of the disease.

It may be doubted, nevertheless, whether the circumstances now enumerated really possess so much influence in the production of yellow fever as by the respective authors is attributed to them. It must not be forgotten that, while the characters of the coast, of the piers and wharves, and of the mangrove forests are constant, and the same every season, they do not annually give rise to the same effects on the health of the inhabitants. A number of years may elapse during which the same causes continue to operate, and do not produce the apprehended effect; and it is only in certain seasons that fever is generated in a sufficient number of points to assume the epidemic character.

The only mode in which I conceive all these discordant statements can be reconciled, is by supposing yellow fever to be a disease proceeding not from the influence of terrestrial *miasmata*, or mere local peculiarities alone, but from atmospheric peculiarities entirely, which, however, operate much more directly and forcibly in situations favourable to the production of terrestrial emanations. While ague is the offspring of the marsh or its margins, and remittent is the effect of a more concentrated form of the same exhalation from any moist surface in the process of solar desiccation, yellow fever appears to be the exclusive product of that state of the atmosphere which takes place after a long continuance of solar heat, with little or no wind, in those points chiefly where the atmosphere of the sea and that of the land are in constant communication and interchange. It is, indeed, a remarkable fact, that the intense form of fever, which has been distinguished as genuine yellow fever, is rather rare in the interior of countries, and is seldom

found in towns even situate on rivers higher than the influx of the tide. The fevers which appear in these situations are more of the remittent character; and in the interior of the American continent, there is little doubt that the lake-fever and the break-bone fever are both representatives of the yellow fever of the coasts. Even in Europe, while the towns on the sea coast and on rivers were labouring under the ordinary epidemic yellow fever, the sickliness in the interior approached more to that of the remittent or remittent-continuous type.

This inference is further corroborated by another circumstance. Whatever resemblance there may be in the characters of the atmospheric temperature in tropical countries, it is clear that every season is not in an equal degree productive of fever. I have already referred to periods of immunity from fever in situations in which the disease is an endemial product; and it has been often remarked, that previous to 1793, though sporadic cases were common, and occasional small epidemics appeared on the arrival of a regiment or a ship of war in the West Indies, most of the islands had enjoyed a period of comparative health, varying from ten to fifteen years. This fact indicates, I conceive, a sort of cycle or periodical revolution in the train of atmospheric phenomena, which at the end of certain periods assume the same position and combination in regard to each other. It appears that yellow fever becomes epidemic neither in consequence of intense temperature alone, nor humidity alone, nor filth, nor the presence of foul docks and wharves, nor desiccated marshes, nor decomposed cabbages or coffee, or mangroves, nor even charred ships-holds, but a certain condition of the atmosphere, which recurs at very uncertain intervals, and of the recurrence of which the circumstances now enumerated are indications. The rapid decomposition of vegetable and animal matters is to be regarded not as a cause of fever, but as an effect of the febriferous state of the atmosphere, which thus displays its insalubrious influence not only on the human race, but on the vegetable world, and on dead animal and vegetable matter.

4th. A most important element, however, both in the actual generation of yellow fever, and in its subsequent propagation, pertains to the nature of the human beings who may constitute its subjects.

a. It is, in the first place, observed, that in the West Indies

and the United States, in ordinary years, natives, and especially the coloured population, are either not attacked, or have mild agues or remittents. During epidemical years, however, these persons begin to suffer from the complaint, and are occasionally cut off by it. In ordinary seasons, on the other hand, the persons attacked are either recently arrived Europeans, or Americans from the northern states; or if the place where they have caught fever be on the coast, natives of the interior and more elevated parts of the continent. It is further to be observed, that though all Europeans and North Americans are liable in the West Indies to be attacked by yellow fever, the disease manifests a decided preference for those from the colder regions. Thus the northern fair races, as the British, German, Swedes, and Danes, are much more liable to be attacked than the French, Spaniards, and Italians; the French are more liable than the Spaniards and Italians; the latter more so than the long resident European or Creole; the New Englander or Canadian more so than the Virginians, Georgians, or South Carolinians; and the same of others.

b. The susceptibility to the disease is further capable of being lost and regained. Thus Europeans who have been long in the West Indies become insensible to yellow fever; but, upon visiting Europe, or going to some of the Northern States of the Union, or to Canada, they have been known, after returning to the West Indies, to suffer an attack of the disease.

c. The knowledge of these circumstances is further requisite to explain the occasional or periodical occurrence of yellow fever epidemics. In ordinary seasons, when the population of a sea-port in the West Indies or Spanish Main is of its usual character, the disease appears only in sporadic cases. But when the population is augmented by the recent arrival of many Europeans, the number of these attacked and destroyed becomes so great that the disorder acquires an epidemic character. Nothing illustrates this principle more clearly than the mortality ensuing on the arrival of a regiment in the West Indies. Among a body of troops maintained from 1812 to 1828, in the island of Jamaica, varying from twenty-four hundred to four thousand, the mortality in ordinary years without new arrivals varied from 1 in 11 to 1 in 13, $13\frac{1}{2}$, and 14, and one year (1823) was so low as 1 in 16. But in 1819, when the 50th and 92d regiments arrived, the mortality rose at once to 1 in 4; in 1822,

when the 33d and 91st arrived, it was 1 in $5\frac{1}{2}$; in 1825, the next season after the arrival of the 77th regiment, it was so high as 1 in $3\frac{1}{2}$; and in 1827, when the 22d and 84th arrived, it was 1 in $4\frac{2}{3}$.

These facts afford some explanation also of the causes of epidemic visitations and their comparative severities. Every epidemic of yellow fever is comprehensive and severe in proportion to the number of susceptible subjects subjected to its operation. After each great epidemic all the susceptible individuals are cut off, and until a new supply is afforded by the arrival of unseasoned strangers from the more temperate regions, no great sickness or general mortality can take place. As this subject, however, has been already illustrated under the head of remittent fever, (p. 172,) I shall merely add a few observations particularly applicable to the present disease.

d. In tracing the history of the first appearance of yellow fever in different places, it is of the utmost importance to be aware of the fact, that yellow fever requires not only a certain number and density of population, but a certain sort of population, in order to develop its energy and display its virulence. In small towns, with thin or limited population, yellow fever scarcely appears at all, or if it does, it appears so rarely and sporadically that it attracts no notice; and all persons who die of what would under other circumstances be considered yellow fever, are said to die of bilious fever, or fever simply. If such places do not increase rapidly in population, or do not become general resorts for commerce, war, or manufacturing operations, it may be long before yellow fever begins to show itself, though exactly in the physical situation favourable to the origin of the disease. If, however, they become much resorted to for commercial purposes, or become important stations for naval and military armaments, in proportion as their population is thereby increased in number and density, fever begins to prevail. Of this principle we have numerous illustrations, but the most striking are afforded by Honduras, La Guayra, New Orleans, and the island of Ascension.

Honduras and the Mosquito shore were long so thinly inhabited, that disease was there unknown till the year 1780, when the expedition under General Dalling proceeded from Jamaica against the Spanish dominions. Almost immediately after debarkation in the San Juan river on the Mosquito shore,

the sailors were attacked on board the ships, and the soldiers before the castle of San Juan, with ague, remittent and yellow fever, and the mortality was in a few weeks so enormous that the purpose of the expedition was altogether defeated. Of 200 men of the 60th regiment sent on this expedition, almost none, and of 300 of the 79th, very few returned. Notwithstanding this lesson, however, which has been recorded by Hunter and Moseley, an attempt was made in the year 1818 and 1819 to colonize this part of America, and the undertaking terminated, as might have been anticipated, in the ruin of the colonists.

An example still more forcible is presented by the town of La Guayra, in lat. $10^{\circ} 36'$. This place, situate on a narrow terrace of level ground between the base of the mountains of Avila and the sea-coast, is exposed to so intense a degree of solar heat, direct and reflected, that its mean temperature at noon from the 27th June to the 16th November is about 87.7° F., and between the latter date and the 19th December, when it may be supposed to be least intense, the mean temperature is 75° F. Previous to 1797, when the population of La Guayra did not exceed 3000, and while commerce, being confined to the vessels of the mother country, necessarily employed few ships, the crews of which were only from Spain, yellow fever was wholly unknown, or at least was never heard of epidemically. Since 1797, however, when the removal of the restrictions opened the commerce of Terra Firma to other European and American nations from more temperate latitudes and colder countries, yellow fever began to affect the mariners and traders from North America, and has since continued to attack others from France, England, and the northern countries of Europe. The disease had even attacked and destroyed newly arrived Spaniards, and natives of the Llanos between Calabozo and Uritucu. It is observed, nevertheless, that the disease does not ascend or cross the Cumbre and Terra de Avila, the mountainous ridge which separates La Guayra from Caraccas,—a distance of not more than three hours ride, or about twenty-one miles.

The instance of the Island of Ascension in 1823, is the next example of the appearance of this fever in the manner now mentioned. This island, which used to be visited only during the turtle season, was uninhabited till 1815, when, in consequence

of Napoleon being sent to St Helena, it became a matter of precaution to occupy Ascension with a few British troops, which, in the course of a few seasons, began to feel the influence of the climate and seasons in the diseases by which they were attacked. These were chiefly dysentery, chronic *hepatitis*, and fever, continued or remittent. In the crew of His Majesty's sloop Bann, stationed off Freetown, Sierra Leone, sickness began to appear, after the 25th of March 1823, in the fore-part of the vessel, and extended gradually to the after-part; and in consequence, the vessel was ordered to Ascension. Here she arrived on the 25th April, with at least forty-five sick, for the reception of whom tents were erected on the shore, at the distance of 500 yards from the garrison, with which also all intercourse was forbidden. Notwithstanding this precaution, one of the garrison was attacked on the 28th, another on the 11th May; and, as it was suspected that the seclusion had been disregarded, every precaution was redoubled for preventing the extension of the disease to the outposts. Notwithstanding this, however, six men, two women, and seven children, were taken ill at Springs, elevated 900 feet above the level of the sea, and four and a-half miles distant, in a S. E. direction, from the barracks. In the meantime, daily attacks took place in the garrison, until twenty-eight of the men were sick, of whom fifteen died, and thirteen recovered.

From these facts Dr Burnett infers, that, whatever was the nature of the disease on the coast of Sierra Leone, it was at the Island of Ascension communicated from the crew of the Bann to the inhabitants of the garrison, and thinks that yellow fever, though not originally contagious, may become so under certain circumstances. It is obvious, nevertheless, that in this case, so long as the island of Ascension was void of inhabitants, neither yellow fever nor any other disease could arise on it, and that one reason of its occurrence at this period was the annually increasing number of inhabitants, combined with the fact, that the weather in 1823 was everywhere marked by the prevalence of endemic fever. It appears, also, that while the disease had appeared in the island without known cause of importation in 1818, the prohibition of intercourse was of no avail in preventing its inroads on this second occasion. If yellow fever, in short, be an atmospherical disorder, every circumstance of soil, climate, and season, concurred to favour its developement on Ascension.

The medical history of New Orleans affords an equally strong illustration of the same principle. On this, however, it is unnecessary to enlarge.

On the personal communicability of the principle of yellow fever, I have hitherto said nothing, for two reasons. In the *first* place, the facts regarding the alleged transmission of yellow fever, and those in opposition to this, are so discordant, and have been so often placed in opposition to each other, that neither of them, I conceive, establishes any positive conclusion. *Secondly*, admitting that these facts are authentic, I do not perceive that they can establish the point either affirmatively or negatively. In the yellow fever of one place and of one year it is said, of several healthy persons coming in contact with the sick, some have been attacked afterwards with the disease; when the disease has appeared in one individual of a family, it has passed to several more;—and those who have slept in a bed or chamber occupied by a patient in yellow fever have also been attacked. Facts of this kind have been repeatedly stated, and have been equally often opposed by the statement of facts quite the reverse; and within the last ten years, a great number of facts of the latter kind have been collected by Fergusson, Musgrave, Dickenson, Doughty, Wilson, Chervin, and Amiel.

I shall merely add in conclusion a few general observations, which, for the sake of brevity, I must express in the aphoristical shape.

1st, It must be regarded as established, from the foregoing enumeration of facts, that yellow fever is the spontaneous product of the atmosphere operating on the sea-coast, or beach, in tropical or warm climates, and in the hot seasons of the southern countries of Europe; and that, whether we are to regard it as the ordinary remittent modified by atmospherical agency and topographical position, so as to acquire an epidemic character, or as a peculiar and specific disease, its formation and developement always depend on climatic and atmospherical influence co-operating with local causes, and not on any physiological or pathological changes in the animal economy.

2d, While the operation of these general and comprehensive causes of sickness must be admitted in order to explain the rise of every well-authenticated yellow fever epidemic, and while it is manifest that these causes must continue to operate

during the whole course of the disease, it is quite unnecessary to have recourse to the assumption of personal infection or its transmission, in order to explain the subsequent progress of the malady ; and the idea of personal transmission, therefore, ought to be rejected as unphilosophical. The atmospherical and local causes which are adequate to generate, must be adequate to maintain, the existence of the disease so long as they continue ; and as they operate in common on great numbers of a community, it is therefore gratuitous to assume the operation of any other order or kind of causes, which can operate only from individual to individual.

3d, It is established by manifold observations, that quarantine restrictions, and cutting off the communication with infected persons or localities, are quite unavailing in preventing the disease from appearing in places, the geographical position and local peculiarities of which are favourable to the production of the disease.

4th, It has been further established by manifold observations, that, however free and unrestrained the commercial intercourse between the West India islands and the ports of Great Britain, and some others in the north of Europe have been, it is quite impossible to convey the alleged infecting principle of yellow fever either in the persons or clothes of human beings, or in other articles, from any of the ports of the West India islands or equinoctial America to the ports of Great Britain, or the north of France, or the north of Europe generally.

5th, In none of the instances in which yellow fever has been alleged to have been introduced by vessels from the West Indies, Havannah, Vera Cruz, or similar places, into the sea-ports of the south of Spain, has it been clearly established that fever was prevailing in the port specified at the time at which the vessel quitted it ; nor if it had, has it been positively proved that any of the crew were taken ill ; and in other instances it has been found impossible to specify the exact vessel. The origin of the disease in vessels in tropical countries further shows, that every observation regarding the alleged introduction of yellow fever into American or European towns by this channel must be viewed as fallacious and open to exception.

6th, In the instances in which the advocates of this doctrine have succeeded in specifying some vessel, it has been uniformly impossible to trace the majority of the subsequent cases to any individual communication with infected persons.

7th, It has been observed in yellow fever epidemics, that, when the first cases have fairly taken place, others follow numerously, after an interval of eight, ten, or twelve days, not in the ratio of the exposure of individuals to infected persons, but in that of the general atmospherical constitution, and that of those individual causes which derange the general health, impair digestion, or disorder the circulation. It is also observed, that physicians, nurses, and other attendants, are not affected in greater proportions than those who have no communication with the sick.

8th, It is well ascertained, that, though strangers coming into a locality, in which yellow fever is prevalent, are liable to be attacked by that disease, in the direct ratio of the northern latitude and supra-marine elevation of the place from which they come, and in the inverse ratio of the duration of their residence in the place in which they are attacked,—it is also certain, that neither these persons, nor others who are attacked by yellow fever, do, when removed from the febriferous locality, communicate the disorder to others resident in a healthy locality, and who have not visited the febriferous locality.

9th, It nevertheless appears to be established, by the experience of numerous yellow fever epidemics, that, when once originated, the disease is epidemic and fatal in the direct ratio of the density of the population, and its proportion of young male subjects, and also in that of their proximity to docks, harbours, or wharves. It hence results that the most effectual method of guarding against attacks of yellow fever, and the propagation of the disease through populous communities, is to remove the inhabitants from the district in which the disease had first shown itself to one more elevated, inland, and ventilated, and to diminish the density of the population, by spreading them over a greater superficial extent.

10th, In all observations and experiments made in the belief of infection, it is inconsistent with sound physiological principles to suppose either that the black vomit, or other discharges of yellow fever, contain any specific poisonous principle, or that the dead subject is itself capable of communicating contagion. Even in diseases of admitted contagious properties this is questionable. It can be only during the life of patients labouring under this fever, that the disease can ever be transmitted by personal communication. And hence all the

facts recorded regarding either the communicability, or the non-communicability, of the disease by discharges, corpses, &c. must be regarded as insufficient evidence. It must hence result, that, whatever precautions may be taken during the life of yellow fever patients, they become quite unnecessary after death.

I must observe, however, that, while the spontaneous or atmospherical origin of yellow fever has been admitted by the majority of those who have witnessed the origin of yellow fever epidemics, several observers who are convinced of this fact have thought, nevertheless, that the disease might afterwards acquire contagious properties. This opinion, which implies that contagion is not a necessary, but only an acquired quality, has received the denomination of the doctrine of *adventitious, or accessory, or contingent contagion*. Originally thrown out by Dr James Lind, with the view of reconciling the difficulties with which the question was embarrassed eighty years ago,* it appears to have been overlooked for a long series of years, during which physicians either adopted, or rejected entirely, the opinion of absolute contagion. Humboldt in 1797 first gave it some degree of currency, by admitting, that, though yellow fever in equinoctial America and the West India islands was entirely void of contagion, it might nevertheless acquire contagious properties in Europe. I have already observed, that Dr Burnett was led to espouse the same opinion, from the phenomena of the fever of Ascension in 1823. But it is not remembered that the causes from which the disease originally sprung were perfectly adequate to maintain its continuance and propagation,—that coincidence does not prove causation,—and that the same atmospherical condition which produces fever in the West Indies or on the coast of Africa, may generate a similar complaint in any other place in tropical or warm countries. Upon the whole, the doctrine of contingent contagion, though not absurd or impossible, is nevertheless not necessary to the explanation of the phenomena, and should be adopted with great reserve.

§. III.—PATHOLOGY OF YELLOW FEVER.

The question regarding the pathological characters and the nosological place of yellow fever is so closely connected with that of its general etiology, that it is impossible almost to separate them entirely; and I have already, in the course of my

* Two Papers on Fever and Infection. Lond. 1763. Pp. 14 and 108.

observations on the latter subject, considered most of the arguments in favour of the notion, that the yellow fever is merely an intense form of the bilious remittent of the tropics. Though this must be allowed to be in many respects one of the most plausible opinions, every one who has examined the question attentively has admitted that it is attended with extreme difficulties.

The whole inquiry may be said to be resolved into two questions,—one regarding the type or mode of progress of the symptoms,—the other, as to the pathological characters of the morbid process which takes place in yellow fever. By most observers these two distinctions have been neglected, either in consequence of the changeable characters of yellow fever in different epidemics, or because perhaps it is really difficult to distinguish them.

The opinions entertained on the type of the disease may be reduced to three,—that which regards yellow fever as an intense and virulent form of the remittent; that which regards it as a continuous fever; and that which regards it as variable in type. The majority of those who have denied the contagious properties of yellow fever, and have considered it as the offspring of tropical heat operating on unseasoned European constitutions, have regarded yellow fever as a remittent, as Towne, Mackittrick, Moultrie, Cleghorn, Lind, Hunter, Rush, Caldwell, Cathrall, and Gilbert. The opinion of Borsieri, who regards it as allied to Hungarian fever, may be referred to the same head. Hume alone distinguishes it from remittent, but terms it Bilious Fever; while Lempriere considers it as a continued tropical fever. Sauvages, however, chiefly on the description of Lining, placed it among continued fevers, under the head of *Typhus*; and in this he was followed by Cullen, Clark of Dominica, Chisholm, Blane, Humboldt, Arejula, Fellowes, Pym, Gilpin, Frank, Harles, and several other foreign authors. In the *third* place, several physicians, among others Jackson and Moseley, appear to regard it as neither constantly remittent, nor continuous in type,—an idea which receives some confirmation from the phenomena of various epidemics.

The opinions on the pathology of yellow fever have been much regulated by those on its nosological characters. By those who have accounted it a remittent, it has been generally viewed as an ardent fever, with bilious disorder. The opinion, that it is oriental plague imported into the West Indies, first

proposed by Warren, and then revived by Chisholm, under the modified shape of typhous contagion, ingrafted on the endemic fever of the West Indies, deserves no serious attention, for two reasons; the first, that plague has never been known in tropical countries, or hot seasons, and ceases on the arrival of hot weather; and the other, that the characteristic phenomena of carbuncles and buboes are entirely wanting in yellow fever. The notion of Sauvages, Cullen, Blane, and Humboldt, that it is a species of *typhus*, is contradicted by the fact, that typhous contagion becomes inert or extinct in tropical countries and warm climates, and by the phenomena of the disease, in which the intense disorder of the gastric organs, and the vomiting and purging of dark-coloured fluids, are never seen in the genuine *typhus* of temperate countries. The idea of Moseley, Valentin, and others, that it is a species of ardent fever,—though in several respects undeniable, is, nevertheless, vague, and conveys no precise conception of its nature. The notion of Reil, that it is a disease of the cœliac artery, is too partial in application; and that of Harles, who regards it as typhous fever, with affection of the biliferous and gastric system, is evidently contrived as a convenient mode of explaining some of the phenomena.

If we carefully compare the combined succession of phenomena in the living frame during yellow fever with the appearances presented by the organs after death, we shall arrive at the conclusion, that it is a peculiar subversion of the action of the capillaries of the whole system, tending to the disorganization or disruption of that vascular net-work, and proving fatal by the deleterious influence of this subverted action on the brain and its membranes, and the stomach, duodenum, and ileum. This process has been distinguished by the name of *increased action*; but this it is not. The action of the heart is indeed augmented at first; and the arteries, distended with blood, transmit to the sensations of the patient and the finger of the physician a more violent impulse than in health. But this action is only preternaturally and temporarily augmented by the irritative stimulus in the capillaries, in which the real and chief seat of disorder is established. The action of the capillaries and exhalants is impaired, enfeebled, and deranged; the motion of the blood is thereby retarded and finally interrupted; the requisite changes are not effected; and, while the capillary system is thus overloaded with dark, unchanged, and

unrespired blood, which speedily becomes disorganized, their apertures eventually give way, and allow the escape of serum or blood in various tissues and organs. Thus, discharges of serum or blood take place into the cerebral chambers; and serum, with albuminous flakes first, and disorganized blood afterwards, escapes into the cavities of the mucous organs, as the stomach and intestines.

That this is the source of the coffee-ground discharge, named black vomit, has been clearly established by the dissections and analysis of Cathrall, Physic, and Stubbins Ffirth, and by the observations of Jackson, Maclean, and many other authorities.

This stagnation and disorganization of the circulating fluid is, however, not confined to the cerebro-meningeal and gastro-enteric capillaries. It pervades those of the mucous surfaces generally, and those of the skin, in which it is the cause of the yellowness which appears in the eyes, face, and neck, and of the marbled spots and mahogany-like streaks over the body at large. Incisions into these parts show that the constituent parts of the blood are broken down and extravasated; and that, while in some parts yellowish serum only is effused, in others, serum tinged with a faint brownish red, and in others, actual imbrowned blood, void of its usual cohesion and tenacity, is effused. This resolution of the coloured coagulum into minute particles is a real disorganization of the circulating fluid.

In particular cases, even blood very little changed is discharged from the mucous surfaces of the nostrils, mouth, lungs, stomach, and intestinal tube, indicating the previous very general injection and congestion of all the capillaries of these organs.

Yellow fever, therefore, consists neither in cerebro-meningeal inflammation alone,—nor in disease of the gastro-enteric mucous membrane alone,—nor in an exclusive affection of the biliary apparatus, as has been imagined and maintained by different authors,—nor in exclusive affection of the whole nervous system,—but in a general affection of the capillary vessels of the whole frame and all the organs. This disorder of the vascular system, however, displays its intensity and malignity in the capillary systems of certain organs more conspicuously than in those of others. Thus, though there is no doubt that the circulation of the lungs is much impaired, and the action of the liver and kidneys and other secreting organs enfeebled and in

a state approaching to temporary suspension, it is in the vessels of the brain, cephalic and spinal, in those of the gastro-enteric mucous membrane, and in those of the skin, that the vascular disorder is most conspicuous. It is in consequence of the difficulty with which the vessels of the brain and stomach bear distension that the energy of the former organ is rapidly impaired, and the latter becomes morbidly irritable, and loses its power of retention; and it is by reason of the intensity of this disorder in these organs, combined with the interruption of circulation and the consequent suspension of all the secretions, that the vital actions of the different organs are suspended or subverted, and death of several individual organs and textures terminates in death of the whole system.

It may become a question, what is the primary cause of this disorder of the capillary system? and it may be referred to two heads; 1st, an affection of the containing vessels; and 2d, some change in their contents.

We have almost no means of determining by positive evidence which of these two is the primary condition, and it is chiefly to conjecture, combined, however, with observation of the living, and inspection of the dead subject, that we can trust.

It seems almost certain that the solid tissues of the vessels are in some manner temporarily deprived of their usual properties, that they are for the time rendered unable to circulate the blood and contribute to the different secretions, in consequence of which they become inordinately distended and congested. Beyond this all is uncertain.

Several observers, however, have further thought that the chemical and mechanical qualities of the blood itself were much changed, and thereby that the fluid was rendered unfit for motion through the minute vessels and secretions. I do not think it requisite to notice all the fancies maintained on this point; but I may mention, that the most tangible and intelligible hypothesis on this subject is that proposed by Dr Stevens, who maintains, that in yellow fever, as in other fevers, the blood is deprived of its saline impregnation, and especially of its alkaline properties, and in consequence becomes darker coloured, less fluid, and less fitted for the purposes which that fluid performs in the economy. This hypothesis may be applicable in some cases; but to show that it is not generally so,

it is sufficient to observe, that the most intense yellow fever attacks some young robust Europeans so immediately after their arrival in a tropical port, that it is impossible to suppose that the constitution of the blood could in so short a time have undergone a serious change, and conversely, that persons who have been long exposed to the operation of causes, which, according to Dr Stevens, might deprive the blood of its saline impregnation, are not more frequently attacked by yellow fever than others. In tropical countries, indeed, it has been observed repeatedly that all the secretions are more saline than in temperate latitudes; and if there be a difference in the saline constitution of the blood, it is rather augmented than diminished in the regions in which yellow fever prevails.

In short, all that can be concluded on this point is, that we have no positive facts on the influence of changes in the chemical or mechanical qualities of the blood in producing yellow fever.

§. IV.—TREATMENT OF YELLOW FEVER.

The treatment of yellow fever has been conducted at different periods, and by different practitioners, in different modes, according to the views which they entertained, and the object which they wished to effect. Dr Dover, who treated a fever, which appears from the description to have been of this nature, practised blood-letting to a large amount with great success; and Towne, who regarded the disease as ardent bilious fever, imitated this practice with emetics and blisters to a great extent. Warren, on the other hand, under the idea of eliminating pestilential poison, studied to allay the irritability of the stomach, and to promote sweating by administering alexipharmic diaphoretics, and keeping the patient under warm blankets. Hillary, again, with the view of obviating the septic tendency of the disease, administered diluents and acid medicines with antiseptic purges, followed by bark and snake-root infusion. Cheney and Hume appeared first to have ascertained that blood-letting was not always successful,—that emetics were always injurious,—that the mildest purgatives were the most efficient, and that revulsion or counter-irritation by blisters and rubefacients was by no means useless. Hunter, from the notion that yellow fever is an intense form of remittent, exhibited purgatives, in order to procure remission, and then administer-

ed bark in large doses. Moseley, reviving the idea that it is an ardent fever, recognized the absolute necessity of seizing the incipient stage of the disease, for practising blood-letting repeatedly until the symptoms abate, combined with purgatives, diluents, the warm medicated bath, and Peruvian bark. Rush, and many of the American practitioners, still employed blood-letting and the evacuant system generally, with the view of preventing fatal congestion; and Chisholm, in order to counteract the effect of a supposed poison, reposed implicit confidence in mercury given in different forms to affect the system. Since the time of these physicians, the treatment of yellow fever, though most marked by the antiphlogistic tendency, has fluctuated much, and has been regulated greatly, according either to the symptoms of individual cases, or to the characters of the prevailing epidemic. It may, at all events, be justly asserted, that practitioners have been more desirous to employ several remedial agents according to their effect on the morbid process and its symptoms, than to trust to any specific method of treatment directed to effect any particular purpose.

From the pathology of yellow fever already delivered, I conceive it results that two principal objects ought to be kept steadily in view in the treatment. The first is to abate and remove the excessive distension and congestion of the capillaries, with sufficient promptitude to prevent stagnation and disorganization of the blood, disorganization of the capillary net-work, and extravasation of their contents;—and the second is to employ such measures as tend to restore and maintain the various secretions. The latter purpose is so connected with the former, that it is not always easy to distinguish them in the therapeutic means used; but it is important for the practitioner to keep them constantly distinctly in view.

The great means by which the first object, that of abating and removing capillary distension, is to be attained, are blood-letting, general and local, the exhibition of efficient purgatives, and cold applications to the head.

Blood-letting is one of the therapeutic agents which has been most frequently employed in the treatment of yellow fever, and yet has been the subject of the most opposite opinions. Though originally employed very successfully by Dover and Towne, and afterwards by Moseley, Rush, Jackson, and Birnie, it has been represented by others as either inadmissible

and injurious, or as at least unnecessary. The truth is, that blood-letting to be beneficial in yellow fever requires three conditions ;—the *first* is, that it be employed in the very commencement of the disease, before the blood in the capillaries has either begun to stagnate and become disorganized, or become so fixed, that emptying the large vessels has no effect in unloading and relieving the small ; the *second*, that it be carried to a sufficient extent to operate on the system at large, and thereby on the capillaries, and on the diseased condition in which they are ; and the *third*, that it be confined chiefly to young, robust, vigorous subjects, whose constitution is unbroken, and in whom, in short, the capillary vessels still possess sufficient energy to contract on their contents, when their quantity has been diminished, and recover their usual powers in propelling the circulation and promoting or restoring the secretions.

The quantity of blood to be drawn varies according to the character of the epidemic, the constitution of the subject, the effects produced, and the stage of the disease. Among soldiers and seamen, it is generally requisite to carry blood-letting to a greater extent, both by amount and by repetition, than among civilians ; and in some recent instances, blood has been drawn to the amount of forty, fifty, or even ninety ounces at once, and by repetition, to the extent of ninety or a hundred ounces.

In general, full bleeding from the arm will, under the conditions prescribed, be adequate to abate the violence of the disorder, and enable the capillaries to contract sufficiently to prevent disorganization. If, however, the headach, with suffusion of the eyes continue, with tenderness at the epigastric region and occasional vomiting, while it is considered inexpedient to draw more blood from the arm, leeches to the number of eighteen or twenty, ought to be applied to the forehead and temples, and the same number to the epigastric region,—the blood drawn by which will often be very beneficial after full bleeding, in relieving the intensity of the symptoms in the brain and gastro-duodenal tissues.

The hair should in all cases be removed from the scalp at the first appearances of pain of the head or orbits, and a stream of cold water should be poured freely on the head, and repeated according to the strength of the patient, and its effects on the symptoms. In the intervals of this remedy, it is proper to apply cold water, or iced water, or a bladder filled with

ice, to the head, as often and as long as the patient complains of pain or heat. This remedy, however, is more effectual after blood-letting than before, and it may be doubted if it is always safe, unless when preceded by more or less evacuation.

Along with blood-letting, it is indispensable to administer those purgatives which act efficiently on the alimentary canal; and in observing the effect of these medicines, the practitioner must take care not to confound the serous or sero-sanguine discharges, which invariably take place in yellow fever from the gastro-enteric mucous membrane, with those which result from the efficient operation of purgatives. In all cases of yellow fever, much serous and sero-albuminous fluid, and afterwards sero-sanguine fluid, are effused from the gastro-duodenal mucous membrane; and the most effectual mode of checking this action is blood-letting from the system, or the epigastric region, derivation by blisters, and the diligent and persevering use of mild purgatives.

Immediately after the blood-letting, therefore, a bolus, consisting of from six to ten grains of calomel, with six grains of scammony, or extract of colocynth, or ten or twelve of powder of jalap, ought to be given, and repeated in two or three hours. Hillary and Hume were in the habit of giving manna and sulphate of potass in whey, with tamarinds, or manna and cream of tartar, alternated with tincture of rhubarb, and some similar carminative infusion; and Dr Cheney, from whom Hume learned much of the method of treatment, always trusted to the mild laxatives rather than drastic purgatives. Hunter, on the other hand, was partial to sulphate of soda or magnesia.

The proper method is not to persevere in the uniform employment of any one purgative medicine, but to vary them daily. Thus, if the patient has taken at first a sufficient dose of calomel and jalap, he should have, about twelve or eighteen hours after, some of the laxative electuary, or a solution of Epsom salts, or the tasteless salts, or the black draught, or two scruples or a drachm of the compound powder of jalap.

In those instances in which the stomach is so irritable that all the ordinary remedies are rejected, it may be proper to give ten grains of calomel with one grain of opium, and afterwards five grains of the mineral with half a grain of opium, repeated every second hour, till other ten or fifteen grains are taken. If the stomach still continue uneasy, and vomiting continues, all medicine by the mouth ought to be abandoned, and the

bowels should then be attempted to be opened by means of glysters, the effect of which, even in allaying vomiting, is often very great. When the stomach has become more retentive, it may then be proper to give the compound colocynth pill, the laxative electuary, or the compound powder of jalap, to keep up the action of the alimentary canal, and prevent accumulation in its vessels.

The second indication in the treatment of yellow fever, viz. that of promoting the capillary circulation and re-establishing the several secretions, is partly included in the first; for all the remedies which have the former effect also contribute to the latter. Some agents, however, act more directly in this way, and therefore may be conveniently enumerated here. The first of these consists of remedies which act on the cutaneous system generally, as washing with tepid water and soap, enveloping the patient in blankets wrung out of hot salt water, and the cold affusion. The first remedy is always of great use for removing any perspired matter from the skin, and exciting its vessels gently to their natural action. The second remedy, which was much and successfully used even in very desperate cases by Dr Dalrymple in the fever of Carthage in 1740, and afterwards by Jackson and others, operates much in the same manner, and tends to elicit the blood from the capillaries into the cutaneous exhalants, and promote the capillary circulation generally. Its effect is likely to be most beneficial when combined with previous washing with soap. The third remedy, the cold affusion, is most usefully employed after thorough washing of the surface with warm water and soap. The stimulus thus applied to the cutaneous vessels, followed by diligent rubbing, is often of great benefit in restoring the healthy action of the skin, in alleviating the sickness, and allaying irritability of the gastro-enteric mucous surface.—(Maclean; Jackson.)

The measures now specified, with blood-letting and purgatives, form the best diaphoretics, and tend more effectually to restore the cutaneous secretion than the hot and stimulating sudorifics. Some practitioners, nevertheless, find it convenient to administer the acetate of ammonia; and Hunter was in the habit of administering James's powder, and Clark the antimonial powder, apparently with benefit. A very good plan is to combine either of these powders with calomel in equal parts, and

administer about ten grains of the mass every second or third hour, till some effect is produced.

In some instances it is desirable to produce a still stronger impression on the skin by the use of sinapisms or even blisters. The latter may be applied to the occipito-cervical region, when the sense of weight and pain of the head resists the bleeding, general and local, or there is any tendency to stupor or coma, and to the pit of the stomach, where sickness and occasional vomiting, with epigastric fulness and tenderness, continue. In some instances, however, it is further beneficial to stimulate other parts of the cutaneous surface, with the view of inducing effectual revulsion from the capillaries of the vital organs. Thus Hume was in the habit of applying blisters to the back and to the arms, before the yellow discoloration came on, or during its continuance, and Cheney was in the habit of applying them to the inside of the thighs, on which the thinness and tenderness of the skin facilitated erythema, and vesication often excited such perfect revulsion as to assuage vomiting and arrest the progress of yellowness, and prevent the approach of gastro-enteric disorganization. To this practice Dr Cheney appears to have been led by observing occasionally that all the symptoms were mitigated, and took a favourable turn, on the appearance of one or more clusters of minute red patches and vesicles, from three or four to seven or eight each, on the breast or epigastric region. With the view of inducing artificially a similar action, he applied blisters to the thighs.

The other organs, the secretion of which it is essential to re-establish and maintain, are the liver and the kidneys.

The liver partakes of the general disorder of the vascular system, and of the particular derangement and stagnation of the gastro-enteric blood-vessels.

In consequence of the suspension of the capillary circulation of the gastro-enteric organs, the portal vein is less copiously supplied with blood, while the hepatic arterial extremities are congested, and bile thereby ceases to be secreted of the requisite qualities, and in due quantity. In order to counteract this state of vessels, local bleeding, derivatives, and purgatives are requisite, and, in addition to these, it may be proper to exhibit frequent small doses of calomel or blue pill, or to rub mercurial ointment on the right hypochondriac region. This seems the only rational mode in which the employment of mercurials

to ptyalism can be satisfactorily explained. It must, nevertheless, be admitted, that the exact influence of this mineral in producing the effect desired, is always more or less problematical. The use of mercurials is chiefly indicated after active symptoms have terminated, and the disease has passed into its congestive stage.—(Clark, Fergusson.)

Though the renal action is always most certainly roused and maintained by those remedial agents which act on the capillary circulation generally, as blood-letting and efficient evacuation of the intestinal tube, some measures act more directly than others on the vessels of these organs in yellow fever. Of this kind are, leeches applied to the loins, the warm bath, the application of warm cloths to the loins, the cold affusion, the acetate of potass, and the saline powder, consisting of carbonate of soda and nitrate of potass. The latter, given in doses of twenty grains of the former ingredient and ten of the latter every second hour, is often of great use in removing capillary congestion, and seems, with the measures already specified, to be advantageous in exciting the capillaries to contraction, and promoting the motion of their contents.

In this manner, apparently, the non-purgative doses of saline medicines recommended by Dr Stevens seem to operate. (Observations on the Blood.) It is not improbable, also, that the effervescing draught produces some benefit in the same manner.

Besides the fulfilment of the two leading indications already specified, it is requisite, above all, in yellow fever, to employ means to moderate and assuage the violence of certain painful and distressing symptoms.

The burning heat is most effectually cooled, and thirst quenched, by cold water drank and the cold affusion; the painful burning of the head and eye-balls is abated by the use of ice and iced water; and the general restlessness may be alleviated, if not removed, by fomenting the lower extremities in cloths wrung out of hot salt water.

Vomiting, if not entirely checked by leeches or a blister applied to the epigastric region, may be allayed by the effervescing draught, with from five to ten drops of sedative liquor, or solution of muriate of morphia in each, or by a few drops of ether, or even brandy given in tea-spoonfuls every half hour, or hour, until the stomach becomes more retentive, and the surface of the skin is generally moist and warm.

In Vera Cruz, where it is conceived that the stimulating treatment is more early and more generally requisite, Comoto, physician to the hospital of St Sebastian, or the Consulate, found it highly beneficial, for attaining the purpose now specified, to administer every hour more than a hundred drops of sulphuric ether, with from sixty to seventy drops of laudanum. — (Humboldt; *Essaye Politique*, Tome iv. chap. xii.)

For the same purpose, ammonia, either in the form of carbonate, with a few grains of rhubarb, or in the shape of the alcoholic solution, may be conveniently given; and calcined magnesia, with fifteen or twenty drops of laudanum, in a wine-glassful of mint tea, was found very effectual by Dr Musgrave. Cayenne pepper was found useful by Drs Wright and Maclean. Camphor and musk, which have been much recommended as diffusible stimulants in this state of the stomach, are said by Clark in the epidemic of Dominica to have rather augmented than allayed the irritability of the stomach.

When vomiting continues long, with or without hiccup, yet without augmentation of the other symptoms, the most effectual sedative is not unfrequently found in a few glasses of sound claret, good hock, or old Madeira; and even in instances in which black vomiting has commenced, recovery has taken place under the cautious and judicious use of these remedies. The safe and useful operation of wine, however, it must be remembered, is most certainly insured by being given after the symptoms of capillary distension and congestion have been diminished considerably, if not removed by suitable evacuation. In some instances in which the stomach rejects one species of liquor, it retains another. Thus, when wine or brandy are rejected, well-bottled porter has been known to be retained, with the effect of assuaging temporarily gastric irritability, and eventually enabling the stomach to bear more effectual medicines or nutriment. (Pinckard and Doughty.) In other instances, mulled port wine, with a due proportion of spicy aromatic, has been found beneficial. In short, at this period of the disease, when the time for active practice is past, the treatment becomes in a great degree empirical or tentative; and while the judicious physician perceives that it is impossible to observe general rules, or treat every case in the same manner, he will watch attentively the instinctive desires and cravings of his patient, and endeavour

to discover whether, among the articles longed for, one is likely to be more directly curative than another.

The great object at this stage of the disorder, when, from the extending yellowness, the frequent vomiting, and the feebleness, quickness, and smallness, or occasional intermission of the pulse, there is reason to apprehend incipient or advancing disorganization of the capillary vessels, and the extravasation of their contents, is to use such remedies as may rouse their feeble and relaxed powers to contraction, and, at all events, prevent the further progress of this destructive process. This object, it is too often utterly beyond the resources of human means to effect; but as it would be criminally indifferent to despair while vital action lingers in the vessels, it is always the duty of the physician to attempt, by rational means, to compass this purpose. Bark was always believed to be of great efficacy in communicating a salutary stimulus to the vessels, and imparting to them that tone which is so urgently required in this state; and sulphate of quinine may be properly employed with the same intention, in as large doses as the stomach will bear.

The foregoing method of treatment is applicable chiefly to the first form of yellow fever in its different stages; and its efficacy will depend almost entirely on the accuracy and energy with which the treatment is applied. If the physician is summoned in the very commencement of the disease, he should adopt immediately the active use of all those measures which may moderate and restrain the perverted action, so far as to prevent the subsequent debility and death of the different organic tissues and systems. If he is not summoned till the eye and countenance become yellow, he has little in his power in the way of active remedies; and his treatment must be in a great degree palliative, and regulated by mere symptoms. He may exhibit sulphuric acid or acetate of lead with opium, to suspend the vomiting of dark-coloured fluids, and opium and camphor to relieve the severity of the hiccup, and direct the injection of glysters, emollient, nutritious, and vinous, to assuage irritation and support the powers; but he will find that it is impossible by these means to operate on the primary morbid action, and that, if the fatal event is averted, it is owing not to the remedies administered, but to some favourable change in the constitution of the patient, and the course of his disease.

In the other three forms of yellow fever, in which the lead-

ing character of the symptoms is that of congestion of the whole vascular system, and consequent oppression of all the vital organs, and restraint of all their actions, medical treatment is still less efficient, and requires to be greatly modified, in order to avoid doing injury.

Blood-letting, or indeed any very large evacuation, is then improper, because, though the large vessels may be thus emptied, the evacuation does not with equal promptitude and effect unload the capillary system, and relieve the different organs, viz. the brain, lungs, stomach, and secreting glands, of the load by which their vessels are oppressed. The method by which it is then conceived that this indication can be fulfilled, is by the preliminary use of such diffusible stimulants and external revellents, as may elicit the blood or its parts to the surface, and, when a more manifest and free action is thus induced, depleting generally and locally, according to circumstances, with much caution, and due regard to its effects.

With these views, it is believed to be best to immerse patients labouring under the congestive form of yellow fever in the warm bath, and to cleanse the surface carefully with soap and hot water, then to rub dry, and employ the flesh brush, with spirituous or stimulating embrocations. If the surface thus become warmer, the face better coloured, and the eye suffused, and the pulse fuller and more tense and frequent, it may then be expedient to draw ten or twelve or eighteen ounces of blood from the arm, or simply to apply leeches to the temples and to the epigastric region.

At the same time, it is desirable to excite the healthy action of the intestinal tube by means of cathartic medicines, as calomel and rhubarb or jalap, with a few drops of clove oil, castor oil, or even croton oil, with or without calomel. If these be rejected, *enemata*, consisting either of infusion of senna and Epsom salts, or infusion of senna, with an ounce or an ounce and a-half of volatile oil of turpentine, should be administered every half hour, until the lower part at least of the intestinal tube is emptied, after which the stomach becomes more retentive, the surface warmer, and the pulsation of the heart and arteries is freer.

The cold affusion after the warm bath, and immediate rubbing by dry cloths, was also employed by Dr Jackson and several of the army surgeons in the same form of fever. But

its effect is ambiguous, and perhaps its use still requires indications more specific than any yet mentioned. The cold affusion alone, after a purging clyster, was used successfully by Dr Archibald of Nevis in the epidemic of 1793. (Clark.)

The remedy most generally indicated, however, in this form of yellow fever is mercury, either in the shape of calomel and opium, or blue pill, or inunction. It is believed that the penetrative qualities of this mineral are particularly calculated for reaching the minute subdivisions of the capillary system, and, by gradually promoting the languid motion of the blood, are then to re-establish the suspended secretions, and relieve the vascular system of its oppressive load. In favour of the actual effects of the mercurial treatment, which has been strongly recommended in this disease by Chisholm, Clark, and lately by Fergusson, it has been observed, that whenever the mineral has begun to display its influence by mercurial fetor of the mouth and the establishment of ptyalism, the symptoms of the disease, and above all its congestive symptoms have begun to subside. This doubtless indicates, with at least equal certainty, the mildness of the disease and the energy of the remedy; and as it cannot be determined in any given case whether the congestion would not have disappeared of itself, or whether it would not have disappeared under the use of other remedial agents, it is difficult to ascertain what proportion of the amelioration is really due to the operation of the mineral. It is further a confirmation, rather strong, of this inference, that cases of yellow fever not unfrequently go on to the fatal termination, notwithstanding the affection of the gums and mouth by mercury. Upon the whole, while it must be admitted that the operation of mercury in the usual mode on the gums in yellow fever, indicates a more impressible state of the system than is common in the congestive form of that disease, and, consequently, a more manageable variety of disorder, it is also to be kept in remembrance, that this result does not prove that the disease is thus cured, but only that a particular morbid state is partially removed. It will depend on the integrity of the vital organs of the individual, and on the subsequent management, whether complete recovery is to be effected.

The mineral may be given either in the form of calomel, beginning with 10 grains combined with one of opium, and exhibiting afterwards two grains, with one-fourth or one-eighth

of opium every hour, until about 40 grains have been taken, or in the manner of inunction by the blue ointment. The blue pill, which is often very easily borne by the stomach, may be also employed with the same intention.

Some practitioners, however, and, among others, M. Dalmás and Dr Stevens, censure more or less strongly the practice of giving calomel, or indeed any mercurial preparation, in the treatment of yellow fever, and represent it to be either unavailing, or directly injurious. If it be entitled to the former character, it is obvious that it is further improper, by supplanting the use of other remedies, which might be not less efficient in doing good, and much less likely to be noxious. It must be admitted that its employment in the congestive forms and stages of the disorder is liable to this objection,—that, as the vital properties of the tissues are then so inert and dormant that the mineral makes little or no impression on them, it is liable to be administered in such excessive quantity as to be extremely deleterious when the tissues begin to recover their properties. This objection, however, applies to every remedial agent; and the only inference that ought to be deduced from it is, that it is improper to trust to mercury alone for relieving congestive symptoms, and that it should not be given in the excessive quantities in which it has been not unfrequently dispensed. When it is carried to the extent of 400 or 500 grains of calomel, as was done by Chisholm and Walker (*Med. Rep.* Vol. i.), it is perhaps extraordinary that death is not produced rather by the remedy than by the disease. One thing is at least evident, that, when such quantities are given without either physiological or therapeutic effects, it must be inferred, that the tissues of the patient have lost their usual organic and vital properties.

In attempting the removal of the congestive state, it is further important to employ contra-stimulant applications externally, and internally, the diffusible stimulants and the neutral saline medicines.

The first class of agents, as spirituous and ammoniacal embrocations and frictions, the hot salt-water bath, enveloping the patient in blankets wrung out of hot salt-water, sinapisms, and blisters, or even scalding with the steam of boiling water directed to a particular part, may be advantageously employed in all cases of congestive yellow fever.

Along with the external application of these agents, ether,

the alcoholic tincture of hartshorn, wine, or even brandy, may be given in small quantities, at proper intervals, with the view of exciting the languid and feeble action of the vascular system. Due care, nevertheless, should be taken not to carry these means to an improper extreme, as their stimulating effect is only temporary, whereas the depressing effect, especially in the case of wine and spirits, is more enduring, and may augment the congestion, which it was intended they should remove.

When they have produced some warmth of the skin, and diminished the oppression of the vascular system, it is then proper to detract blood either from the head or the epigastric region, or both, by means of leeches, according to the predominance of the symptoms in each region, and thus relieve the congestion of the vital organs.

Saline medicines, more or less neutral, have been long exhibited in the treatment of yellow fever, either as cathartics, diuretics, or diaphoretics. Though, in the first case, these agents act directly on the intestinal canal, and in the second they are absorbed by the vessels, circulated, and act on the capillaries of the skin, mucous surfaces, and different glands, yet even the cathartic saline medicines may be given in doses so moderate as to act in the latter mode also. Thus the Epsom salts, Rochelle salt, and common salt, may be given in such doses as to act like acetate or nitrate of potass, acetate of ammonia, citrate or carbonate of potass, or any other diaphoretic or diuretic salt. Administered in this manner they are absorbed, and, by being carried into the circulation, are mingled with the blood; and, while they change the constitution of that fluid, may rouse the capillaries and secreting vessels to more energetic and efficient action.

The speculations of Dr Mitchill of New York regarding the presence of nitrous acid, which he named *septic*, as a cause of fever, and especially yellow fever, led him to propose in 1797, (Med. Repos. Vol. i. p. 253,) the administration of the alkaline salts and earths, as effectual means of curing that disease. Among this class of remedies, however, he enumerated not only the carbonates, but the sulphates, muriates, phosphates, and tartrates. The following year, Dr Adolphus Lent, a pupil of Dr Mitchill, in an inaugural dissertation on the alleged acid properties of pestilential vapours, recommended strongly the use of alkaline remedies and antidotes; and soon

after, in the course of the same year, and afterwards in 1800, Dr Barker of Portland in Maine, published an account of the effects of treating the epidemic fevers of that locality, by administering chalk, lime-water, and carbonate of potass, after and with suitable purging.

After this period, the administration of alkaline remedies came into use among American physicians; and while Currie and Hosack recommended lime-water in frequent small doses with milk, to check black vomit, Harris, Vaughan, and Seaman employed the alkalis, especially the carbonate of soda, which was recommended by the editors of the Medical Repository, (Vol. iii.) ; and Archer, in 1804, wrote in favour of the carbonates of lime, magnesia, and potass, as curative and preventive remedies. In this manner the employment of alkalies, and especially carbonate of soda, appears to have been adopted by many who could not trace the introduction, or assign the principle on which it was given. It appears, at least, that the practice has been employed for several years at Rochester, in the Tennessee country, where the lake fever is very fatal; and that Dr Henry of that town has long been in the habit of administering large doses of carbonate of soda in the treatment of yellow fever, without any specific object, but simply from having found, that cases so treated recovered more easily and more frequently than those in which this salt was not administered.

Dr Stevens, who has lately solicited strongly the attention of the profession to this subject, was led, during the prevalence of an epidemic yellow fever in the island of St Thomas in 1827, to try the effect of saline medicines, exhibited so as not to purge, and which, consequently, were absorbed by, and circulated through, the vascular system; and he found it to be followed by speedy amelioration of all the symptoms, disappearance of the incipient yellow suffusion, and prevention of the black vomit. Since that period, this mode of treatment has been employed both by Dr Stevens and Dr G. W. Stedman, and other practitioners, it is said, with great benefit, and a larger proportion of recoveries than under the ordinary methods of treatment.

The method which Dr Stevens first adopted was, after blood-letting and active purging, to exhibit a saturated solution of muriate of soda and nitrate of potass. If there were symptoms of acid in the stomach, he began by giving the alkaline carbonates, as carbonate of soda or potass, in order to

neutralize the supposed free acid ; and after this was effected, the salt and nitre only were exhibited. Subsequently, however, the nitre was abandoned, and chlorate of potass, originally recommended by Currie of Philadelphia on an erroneous hypothesis, substituted in its place. His most recent formula consists of half a drachm of carbonate of soda, one scruple of muriate of soda, and seven grains of chlorate of potass, which are to be administered every hour or hour and a-half, until the symptoms of the disease begin to abate.

The object of Dr Stevens in this mode of treatment is to act gently on the stomach and intestines, to introduce the saline matter into the blood, to prevent that fluid from being dissolved, and to maintain the secretions, and particularly that of the kidneys, until all danger is past. These views are closely connected with the opinions which Dr Stevens maintains as to the state of the blood in yellow fever. It appears to me that these opinions, if not positively erroneous, are at least not susceptible of general application ; and I therefore refer the administration of saline remedies to the head to which I conceive their physiological effects entitle them. These effects are absorption and circulation with the blood, preservation of the fluidity of that liquid, and consequent prevention of congestion and stagnation in the capillaries, promotion of the secretions, and prevention, therefore, of disorganization of the blood, and the capillary net-work of the cerebro-spinal system, and of the gastro-enteric mucous membrane. It is in the disorganizing stage, and the congestive form, in short, that the remedy is useful.

Of the therapeutic effects of the saline treatment, some idea may be formed from the facts stated by Dr Stevens and Mr Greatrex, that of from 40 to 50 cases admitted into hospital only three died ; and that of 340 cases, both remitting and yellow fevers, admitted into the hospital of Trinidad, from 6 to 72 hours after the commencement of the attack, not a case had died. The only objection to this result is, that the success seems too great for the means used. (Observations on the Blood.)

Emetics should be given in no form or stage of yellow fever.

When the proper febrile symptoms have been controlled, it is of the utmost consequence to conduct the convalescence in such a manner as to prevent a relapse. With this view many practitioners are in the habit of administering sulphate of quinine ; and it may be useful, in cases in which the stomach en-

dures this remedy, to give from three to five grains of it with port wine, claret, hock, or Madeira, four or five times daily.

The great object, however, should be to regulate the action of the skin and alimentary canal, the former by tepid washing and rubbing, with proper clothing, if the patient is able to sit, the latter by gentle doses of the warm purgatives, as rhubarb or aloes, with ammonia or soda, or magnesia, or any of the purgative tinctures, and nutritious but unstimulating diet.

Gestation has been much commended by Jackson as a remedial agent. It may be occasionally useful in the incipient form of the disease, but is not calculated to be beneficial in the confirmed stage. In the convalescent, however, after all febrile symptoms have been subdued, recovery is more rapid when aided by this auxiliary than otherwise.

Removal from the district or locality in which the fever has been contracted is also advantageous, and indeed ought to be carried into effect whenever it is practicable.

It is proper here to remark, that, whatever therapeutic means be adopted, a large proportion of patients in yellow fever necessarily become its victims. The mortality, indeed, varies at different periods and seasons. From the facts collected between 1779 and 1783 by Dr John Hunter, already alluded to, it appears that in general among newly arrived troops the mortality varied from 50 to 35 per cent. In the 85th, 92d, 93d, and 94th, it was in the first six months exactly 40 per cent.; and in the course of four years it was exactly 25 per cent. It appears that subsequently this rate of mortality has on the whole rather abated. In an average of sixteen years, taken between 1812 and 1828, it has descended to $13\frac{1}{2}$, which is a little more than half what it was in the time of Hunter.

This is somewhat less than the lowest mortality at Vera Cruz. In the hospital of *St Sebastian*, which is supposed to be the best regulated in that town, the average mortality is about one-sixth, or 16 per cent.; and in the year 1803, of 4371 patients admitted into all the hospitals, 700 died, which is still about 16 per cent. In the *San Juan de Dios*, however, during great epidemics, the mortality rises to the frightful rate of 30 and 35 per cent.

In Europe, the yellow fever appears to cause a still higher rate of mortality. In 1800 it was in Cadiz, Seville, and Xeres, 20, 26, and 40 per cent.; respectively; and in 1804, it was in Alicante 27, and in Cadiz 40 per cent.

CHAPTER IV.

CONTINUED FEVER.

Febres Continuae ; Uniform Fever, Continued Fever, Continuous Fever, Continent Fever.

Iodoci Lommii de Curandis febribus continuis Liber. Amstel. 1745.—Quesnay, *Traité des Fievres Continues*, 2 tomes. Paris, 1753.—Chalmers on Fevers, Lond, 1768.—Dissert. by Forst, 1747 ; Dercum, 1748 ; Müller, 1777 ; Reil, 1794 ; Aygaleng, 1800.—J. C. Reil, *Fieber-Lehre*, I Band. xxv. Kap. Halle, 1799.—Caffin, *Traité des Fievres Essentielles*. Paris, 1819.—Bouillaud, *Traité Clinique et Experimental des Fievres dites Essentielles*. Paris, 1826.—Boisseau, *Pyretologie Physiologique*. Paris, 1824 et 1831.

DEFINITIONS of continued fever previous to the time of Cullen were objectionable by the want of precision, and by general inaccuracy. With the definitions of Sauvages, Vogel, and Sagar before him, this nosologist proposed one which was founded at the same time on the phenomena, as they had been done, and on the absence of the cause to which intermitting and remitting fevers were ascribed; and in this respect he had done little more, indeed nothing more, than modify the definition of Vogel. This nosologist made continued fever to consist in a process which went on without intermission night and day, but which, with remission, underwent what he termed *exacerbations*, either daily, or every third, or every fourth day. This definition Cullen modified by inserting the circumstance of two paroxysms daily.

He was, however, aware that this was insufficient in many instances to distinguish continued fever from remittent fever, which not unfrequently presents a process in which the observer can recognize little change, unless occasional slight exacerbation, and consequently slight remission in the interval between two such exacerbations. “As we assert,” he says, “that continued fever consists of repeated paroxysms, it may often be doubtful whether any given fever belongs to the order of continued or remittent. With the view of deciding this property, we give a different definition from our former, both of intermittent and of continued fevers; and in most cases, I think, these definitions may now be used with facility and certainty. But I leave the point to be examined by those who are more

sagacious, whether our definitions are correct, or whether any thing can be given better. It is our belief that every continued fever consists of two paroxysms daily; but as it is possible that double paroxysms may occur both in certain intermittents and in remittents, this character alone is insufficient to distinguish continued fevers. I by no means, indeed, wish them to be distinguished by this character only, for in every doubtful case, I think that a remittent may be distinguished from a continued fever either by its origin or by its type, or by proceeding from an intermittent. Finally, it is for those conversant with such subjects to inquire whether continued fevers may not with certainty be distinguished by arising from a cause often manifest and very frequent, namely, human contagion."

It is obvious that Dr Cullen here admits the extreme difficulty of the subject itself; and perhaps it might have been as well for the purposes of practical medicine, that he had openly avowed the difficulty in which the distinction was placed. Suppose we admit the necessity of deriving a character from the causes, either true or alleged, of the disease, it is by no means ascertained that all continued fevers arise from human contagion; and the first division of Dr Cullen's arrangement (*Synocha*) is admitted never to proceed from this source. It is, however, a decided error in nosology, we conceive, to admit into a definition characters about which there may be doubt, or has been doubt; and of this kind, in general, are those regarding the origin of fevers, either from contagion, or from exhalations of the soil.

It is, therefore, from the phenomena only that the process of continued fever is to be defined and distinguished from intermittent or remittent fever; and if it cannot be distinguished in this manner, it ought not to be represented as different. Agreeably to this principle, the characters of continued fever are reduced in the Cullenian definition to two; 1st, the presence of exacerbations; and 2d, the circumstance of two daily paroxysms.

I believe there are few examples of febrile disease in which it is not possible to recognize occasional increase in the intensity of the symptoms; for example, greater headach, more flushed countenance, and an appearance of more intense general heat. But I am not sure that these temporary aggravations are so regular as Dr Cullen's definition represents them

to be. Almost all observers agree in representing the phenomena of continued fever to be more distinct and more violent in the latter part of the day, and to undergo a slight alleviation towards morning ; but the degree and the rate of these changes and revolutions has not been so distinctly and regularly marked as to warrant very positive conclusions. They are certainly not the same either in degree or in form in all kinds and varieties of continued fever ; and the subject demands more accurate observation.

In assigning two paroxysms daily as a character of continued fever, it is evident that Dr Cullen was biassed somewhat to the view which he had taken of the relation between intermittent and all other fevers. It certainly gave his semeiography of fever a great degree of simplicity, neatness, and symmetry, to adopt the paroxysm of intermittent fever as the standard of the febrile motion of all, and to represent the different kinds of fever as depending on modifications of the manner in which this paroxysm took place and recurred. It had further a great appearance of consistency to represent these paroxysms and their combination as connected with a *diurnal revolution* of the motions of the animal body. (56). That this diurnal revolution does exist may be true, although it is one of those hypothetical subjects on which I decline to enter. That the paroxysms of intermittent fever sometimes become so closely connected as to convert the disease into remittent or continued is also true ; but I do not regard this sufficient to show that every continued fever consists of two paroxysms daily. Whether these revolutions take place or not, and whether this connection between the paroxysms of intermittent and continued fever be real or imaginary, is of little consequence in a practical view. For it is quite certain that the important question to the practical physician is to determine from the phenomena, and from the accompanying circumstances, whether the disease which he has to treat is a fever which is to be interrupted at certain periods, and in a definite manner, or one which is to proceed in an unbroken and continuous course for a given time.

On this subject it is not unimportant to know the sense in which the judicious and learned Borsieri employs the term *Continued Fever*. After making a distinction between continuous and intermitting fevers, he draws another between Continuous Continued fevers and Continuous Remitting fevers. The

Continuous Fevers, he says, are to be distinguished by running their stages or periods in one single circuit, or in a connected series of morbid phenomena; but not in such a manner that the violence of the fever is always the same or uniform, or the symptoms at all times of equal intensity throughout. Torti, Lieutaud, Sauvages, and De Haen, have well observed, that fevers of this kind do not proceed to their term without any change in intensity; for though they neither resemble remitting fevers, in observing certain hours of aggravation and remission,—nor intermitting fevers, in the alternate paroxysm and intermission,—still they undergo a manifest alleviation in general in the morning, and as obvious an exacerbation in the course of the day and evening. It is, therefore, according to Borsieri, not so much uniformity of phenomena, as their unbroken connection from the first to the last period of the disease, that characterizes continued fever.

With this view I am disposed in general to agree. But it is necessary to remark, that it is exceedingly difficult to apply the characters thus given in practice. Whether it arise from the defect of observation and the carelessness of observers, or from the actual nature of the inquiry, it is certain that nothing is so difficult as to determine in many instances whether a fever, or an epidemic of fevers, is to be referred to the head of remittent or continuous fevers. A good example of this difficulty is found in assigning the nosological place of yellow fever of the West Indies and New Continent, and of that of the south of Spain, of the fever of the Mediterranean, already noticed, and indeed of several epidemics which have at various periods appeared in some of the towns of Europe. Not only are physicians not yet agreed whether yellow fever is a remittent or a continued disease, but it appears that in some seasons it assumes the one character, and in others the other.

For these reasons, and because I avoid all contested points as much as may be, I shall confine the species of continued fever to those only in which the continuity of phenomena, if not uniform and invariable, is at least not made the subject of doubt. These may be referred to the following general heads;—*1st*, fevers in which the circulation, especially of the capillaries, and secretion, are much deranged; *2d*, fevers in which this derangement of the circulation is connected with distinct disorder of one or more of the vital organs, and a tendency to disorgani-

zation or disruption of the capillaries ; 3d, fevers in which both these orders of phenomena are combined ; and 4th, fevers in which a tendency to gangrenous inflammation and disorder of the glands is conjoined. The first is that which corresponds to the inflammatory fever of practical authors,—the *Synocha* of Sauvages and Cullen,—the *Continens inflammatoria simplex* of Selle,—the *Fievre angiotenique* (*Febris angiotenica*) (*αγγειον τενω*, *vasa tendo* *) of Pinel. The second corresponds to the putrid and nervous putrid fever of practical authors,—the *Typhus* of Cullen and Sauvages,—the *Atactic* or irregular fevers of Selle,—the *adynamic* and *atactic* fevers of Pinel,—and perhaps many of the fevers which appear epidemically in ships, hospitals, jails, and in certain situations in armies. The third represents the *Synochus* or common continued fever of Cullen,—perhaps the most frequent form which fever assumes in these countries. The fourth includes the oriental plague.

SECTION I.—SIMPLE FEVER WITH MUCH AFFECTION OF THE SANGUIFEROUS SYSTEM.

Inflammatory fever, *Febris inflammatoria simplex*, Selle et auctorum ; *Synocha*, Sauvages, Cullen, Reil ; La Fievre angiotenique, Pinel ; Entzündungsfieber, Reil, &c. ; *Continua non putris*, Boerhaave ; *Synochus*, Vogel.

It has been doubted by many whether there be in nature a disease corresponding to the acute inflammatory fever of nosologists ; and several practical authors, since the time of Cullen especially, have laboured to exclude this form (*Synocha*) from the family of primary or essential fevers. It may indeed be said that the definition given by nosologists either is derived from the earlier period of some of the essential fevers, or applies to fevers symptomatic of local disease. Gregory was in the habit of saying that he had not seen such a fever in a practice of 30 years ; Clutterbuck and Mills particularly in this country have laboured to show that there is no such disease as

* It is singular that Hildenbrand appears to misunderstand this term, and by a strange enough etymology converts it into angiostenic,—*strength of vessels*. Strength of vessels is a healthy state, and should not be used to designate a disease. Tension of vessels may be a morbid condition, and the term was originally used by Selle, and adopted by Pinel, to express that morbid state in which all the vessels are at once so full and so constricted as to suspend the usual secretions.

fever without local affection, and especially affection of the brain; Bateman confirms the observation of Gregory; and Percival doubts the existence of simple fever without local disorder; while Broussais and his followers contend in plain terms, that the strict inflammatory fever owes its place among the primary or idiopathic fevers, rather to the defective observation of nosologists than to its own nature.

Into the merits of this controversy it is foreign to my purpose to enter. I shall merely submit the following remarks in justification of my adherence to the division now stated.

First, I observe, that though cases of fever without local affection are of extremely rare occurrence, and may probably depend on the imperfect observation of the attendant, there are nevertheless instances of febrile action existing in the system without any cognizable disorder of any organ. *Secondly*, It seems very doubtful, as will appear afterwards, whether any case of fever is attended with any peculiar local affection at the commencement of the disease; and in every fever there appears at first to be a uniform and general affection of the whole capillary system. As the disease advances, some set of capillaries appears to be more particularly affected than others; and in this manner only can the local affection be said to exist. It comes then simply to be a question, whether the definition is to be taken from the commencement, or the termination, or the whole course of the disease. Little doubt can be entertained that the latter is the only legitimate mode of framing nosological definitions, and to this, therefore, the nosologist must look for his idea of the simple inflammatory fever. In the *third* place, therefore, if it so happen that an attack of fever comes to an early termination, about the second, third, or fifth day, it may do so without manifesting any peculiar local direction; and this appears to be the form of fever from which nosological authors have been induced to derive their description of *Synocha*. It is, indeed, true that such febrile attacks seem to be connected with the suppression of some habitual discharge, or with the effort required by the system to establish some peculiar action,—for instance menstruation in the female; and perhaps, if they were always strictly examined, they would prove to be at all times produced in a similar manner. Without attempting, however, to investigate this point with excessive minuteness, it may be sufficient to say, that it is convenient

to have a nosological head, to which all febrile attacks of this description may be referred, especially as they are admitted by Willis, Quesnay, Selle, Borsieri, Frank, Pinel, Hildenbrand, and others, from whom it would be unjust to withhold our confidence. Any other peculiarities, and, indeed, every circumstance relating to the merits or the demerits of this modification of febrile action, will be most easily understood in the consideration of its history, which I am now to deliver.

Synocha ephemera, Diary Fever; *Synocha simplex*, Simple Continued Fever; *Synocha plethorica*, *Synocha sanguinea*, Fever of the Blood of Avicenna.

The best and simplest example of *Synocha* is perhaps to be found in the diary fever (*Febris diaria*; *F. ephemera*) of authors. This consists in a febrile state of the system, lasting for 24, 36, 48, or 72 hours, without much inconvenience, and terminating either in slight hemorrhage or spontaneous sweating. Though the diary fever is sudden in attack, it comes on in general without conspicuous shivering, yawning, or somnolence. Its presence is indicated by slight and transient sensations of cold, followed by great and general heat, and a sense of bruising and soreness over the body. With more or less headach, the face is red, flushed, and slightly swelled. The respiration is oppressed, panting, and more frequent than natural; the pulse quick, full, and strong; the tongue a little furred, and much thirst. The urine is in general scanty and high-coloured, the skin is dry, and the bowels are constipated.

When these symptoms have continued for 24 or 48 hours, they begin in general to give way. The skin becomes cool and partially moist, the thirst abates; the respiration becomes less quick, and the panting disappears; the pulse becomes slower; and the headach and general soreness recede. At the same time, the urine begins to deposit a copious sediment, and eventually becomes more abundant and lighter coloured. In some instances *diarrhœa* takes place; in others a little blood is discharged from the nose; or sweating, more or less general, occurs. In some instances, these changes are not effected till the lapse of 72 hours; and when the disease is protracted beyond this term it ceases to be a diary fever, and must be regarded as a continuous fever.

In the latter case, the skin continues hot and dry, or partially

and imperfectly moist; the pulse quick, from 90 to 104 or 112; the tongue covered with a white or whitish-gray viscid fur, with much thirst and squeamishness, or loathing of food. If the pulse be attentively examined, its motion will be found oppressed and restrained, in proportion to its frequency, with a slight tension in the beat. The patient complains of a sort of weight and languor at the epigastric region, which evidently diffuses itself over the whole frame, giving the countenance, though flushed, an air of languor and oppression; and if the belly be inspected, it will be found that the epigastric-umbilical region is fuller and more distended than natural, sometimes with, often without, any pain on pressure. The most prominent character of this form of fever, however, is the general listlessness, inactivity, and aversion to exertion on the part of the patient, who cannot without uneasiness maintain the erect position. If he attempts it, he complains of weight of the head, or even lightness of the head,—a sensation corresponding to giddiness,—more or less weariness, and pain of the back, and a gnawing weary sense of pain in the lower extremities.

The duration of this state varies according to the mode of management and the constitution of the patient. If it be treated by rest, low diet, and moderate evacuation, it is generally completed in about from five to seven days. But if the patient persists in going about, or making corporeal exertion, and if he lives as usual, it may be protracted to eleven days, or two weeks. Storck, Quesnay, and Borsieri, represent the shortest cases of *Synocha* to be terminated in four days, and the longest within seven. But I have witnessed fevers which the absence of conspicuous local disorder, except what I shall presently state, obliged me to refer to this head, protracted to fourteen and seventeen days.

Respecting the course of the symptoms, though observing a continuous or uninterrupted train, they nevertheless present exacerbations, which are either periodical or influenced by the operation of external or physical causes. In general, the surface is coolest, the face least flushed, and the pulse most moderate in the morning, from eight till eleven or twelve. In the evening the countenance very generally becomes a little flushed, the skin hot, and the pulse rather fuller and stronger; and between one and three in the morning there is always much heat and flushing, with acceleration of the number of the pulse,

(115 to 120) increased thirst, and some excitation of the different functions.

The symptoms even vary from day to day, being sometimes less intense and distinctly marked on one day than on another. These horary and diurnal undulations have led to the establishment of certain distinctions.

The ancients distinguished this fever, according to the course of its symptoms, into three species; 1. The Homotonous or Acmaistic (*Synocha homotona* vel *Acmaistica*,) when the tenor and intensity of symptoms is uniform from beginning to end; 2. The Epacmaistic or Anabatic (*Synocha Epacmaistica* vel *Anabatica*,) which after its commencement augments, abates, or remits, and then terminates; and the Paracmaistic (*Synocha Paracmaistica*,) which, after an accession rather intense, gradually abates until it terminates. Though these distinctions are probably more refined than is necessary, and are of little practical importance, it is not to be doubted, that the undulations in the morbid phenomena are sufficiently real and manifest to justify their admission as nosological characters.

Early life, the approach of puberty in both sexes, and that of the menstrual secretion in the female, sanguine temperament, plethora, either habitual or temporary, pregnancy, a hot dry season, or a cold season with east wind and frosty weather, are the usual circumstances which operate as predisponent causes. Exposure to cold, irregularity in diet, either by excess in eating or drinking, great fatigue of body or mind, great efforts of body or mind, exposure to unusual heat, or insolation, are the circumstances which most frequently operate as excitants.

§. II.—The PATHOLOGY of primary *Synocha* is rather obscure, for it is always difficult to prove the total absence of local affection.

Quesnay, by adopting partially a notion of Willis, considered these fevers as caused by some morbid secretions in the stomach and bowels; and as he conceived that the use of the febrile motion was to expel these matters, he denominated them depuratory (*Febres depuratoriæ*,) and excrementitial. The existence of this alleged impurity, however, was denied by Selle, who maintained, that in inflammatory fever there is some depravation of the blood, and that the blood-vessels are the principal seat of disorder. The notion of Reil, that inflammatory fever consists in exalted irritability associated with a sufficiently strong power of operation in the affected organs, contains only

part of the morbid process, without looking to the original cause of the exalted irritability, while, by admitting that some of the organs are disordered, he confounds it with symptomatic inflammatory fever.

The idea that this form of fever consists chiefly in an affection of the blood-vessels, appears to have occurred faintly to Forest, and more distinctly to Baillou, who applied to it the name of *Febris Venosa*, in contradistinction to the gastric fever so common in Paris. This doctrine was still more distinctly inculcated by Pinel, who represents inflammatory fever as an exclusive affection of the blood-vessels.

A still more distinct modification of the same doctrine was advanced by J. P. Frank, who, from some dissections in which he found the inner surface of the arteries much reddened, inferred that inflammatory fever consists in inflammation of the blood-vessels,—in short, in *arteritis*. This opinion has been recently embraced by Bouillaud, and illustrated by several dissections. (*Traité Clinique et Experimental*.)

Lastly, Boisseau, studious to reconcile the hypothesis of Broussais with that of Frank, has been at much pains to show that inflammatory fever, though essentially an irritative affection of the sanguiferous system, consisting of the heart and arteries, is nevertheless always associated with disorder of some tissue or organ; that the former irritative disorder commences the process, and is eventually communicated to the latter.

The whole of these opinions are so much at variance with each other, and with the results of observation, that it is by no means difficult to recognize their insufficiency; and I conceive, that careful study of the phenomena of simple or idiopathic inflammatory fever, compared with those of symptomatic fever, will justify the following conclusions.

In the *first* place, in every case of simple inflammatory fever, there is a distinct disorder of the capillary vessels of the whole frame, of all the tissues, and of all the organs. I do not pretend to specify the nature of this disorder; but I can point out its effects.

In the sound state of the capillary system, the blood moves with facility from the arteries into the capillaries, and there, after contributing to the processes of nutritious deposition, secretion, general and specific, and exhalation, moves with equal facility into the venous branches. It is to be remembered also,

that, so long as these capillaries, which have been shown, by the microscopical observations of Dr Marshall Hall, to be distinguished by the peculiarity of possessing a uniform calibre, or being merely innumerable intersecting cylindrical tubes, retain their natural properties of sensibility, irritability, elasticity, or axipetal resistance, and what has been named *tone*, the blood remains not within their cavities, but is in incessant motion and transit, and as rapidly as it is conveyed by the conical arteries, it is removed with equal readiness by the veins.

That these processes, also, of circulation, nutrition, secretion, and exhalation, be carried on perfectly, it is requisite that the minuter vessels concerned in secretion and exhalation retain their usual properties.

The effect of the remote causes of fever, however, is such as to impair immediately the sensibility and irritability of the capillary tubes, which thus fall into a state of atony or general relaxation,—a condition which has been very absurdly and inadequately designated by the German pathologists as palsy of the capillaries. (*Lähmung*.) In consequence of this temporary loss of power, the capillaries become unable to transmit to the veins the blood conveyed to them by the arteries. They become distended; and as their elastic force and axipetal or central contractility is also impaired, they are unable to contract on the columns of blood with which their canals are distended. In this manner the circulation of the blood in the capillary vessels is impeded or retarded; secretion and exhalation are impaired; and nutrition is suspended.

This state of vessels is not confined to one set of capillaries in inflammatory fever, but is diffused over the whole capillary system in every texture and organ of the living body. It affects the capillaries of the skin, and the mucous membranes most; those of the serous membranes in a less degree; those of the secreting glands; those of the muscular organs and the fibrous membranes; and those of the brain, cranial and spinal; and the cellular tissue generally.

In some of these textures, nevertheless, it is in different fevers and in different individuals more marked than in others. Thus in one person the disorder is most marked in the skin and mucous surfaces, especially the gastro-enteric mucous membrane, giving rise to some fulness and distension of the epigastric-umbilical region, and rendering the bowels slow and

very difficult to be moved by the usual remedies. In others, on the contrary, and at different seasons of the year, the capillaries of the fibrous membranes and muscles are most affected, and give rise to the oppressive sensation of languor, fatigue, and even soreness of the limbs and person generally.

In all cases of inflammatory fever the impaired action of the capillary system is very remarkably evinced in the capillary vessels of the different glands, and invariably impedes their action, so much as to render the aqueous part of the secretion less copious, and probably, to diminish the proportion of specific secreted matter. I must not omit to state, however, that it has not yet been determined whether the proper biliary matter of the bile, or the urea of the urine, is less abundant during fever than at other periods of health. One fact is certain regarding the latter secretion, that while its aqueous proportion is much diminished, after the febrile disorder is fully established, a matter soluble at 97, but insoluble in the cold, and which is partly uric acid, and partly urate of ammonia, is deposited. I think I have remarked that this is formed at the expense of the urea during the febrile disorder. But on this point we require some more experiments.

The disorder or impaired action of the capillaries, followed as it is by impeded transmission of blood, proves a source of irritation to the heart, which then is thrown into a state of excessive, but inefficient action, part of which is occasioned by mechanical and chemical, part by physiological causes.

As the capillaries, being unable to transmit blood, are really distended, and are still receiving blood from the heart, in the beginning of the febrile attack, some degree of stagnation actually ensues, and thus affords a mechanical obstacle to the further transmission of blood from the heart. This is the cause of the heavy labouring action of the ventricles in fever.

The heart, however, is not a mere mechanical forcing machine. Endowed with the vital properties of organic sensibility and irritability, it is incapable of being exposed to any mechanical stimulus, without being excited to a species of inordinate or excessive action; and the result is, that while the column of blood in the arteries acts as a mechanical obstacle, which the ventricles are incessantly attempting to propel, these chambers are never completely emptied, and, consequently, before the last stimulus has ceased to act, a new one is applied, or rather, to speak more

to the matter of fact, the stimulus of the blood never ceases to operate. This is the cause of the frequent ventricular contractions.

At the same time the mechanical resistance afforded to the ventricles induces a sort of inefficient action, with a jarring thrill in these muscular organs, which, communicated to the arteries, gives the sense of a hard contracted impulse, with oppressed or restrained motion of the artery.

It must farther be remembered, that, as the blood does not readily flow through the capillaries, it enters the veins in less quantity, and at a slower rate than natural, and hence it is less copiously and rapidly conveyed to the *venæ cavæ* and right chambers of the heart. This is at once a principal cause of the sense of feebleness in all the organs, and especially of the impaired energy of the brain, indicated by lightness of the head, giddiness, and tendency to *syncope* in the erect position, felt in all cases of fever; and eventually becomes, aided by rest and appropriate remedies, one of the natural means of effecting a cure. The blood which is thus retained in the capillary system is withheld from giving an undue stimulus to the right side of the heart and the organs generally; and if the capillaries still possess sufficient power or tone to contract and recover their natural properties, the blood contained in them during the height of the febrile process is at length readily received by the emptied veins.

The state of the capillaries, and of the circulation generally, therefore, in fever, embraces the following circumstances;—*First*, impaired energy of the capillary net-work, and inability to transmit blood either for nutrition, secretion, or excretion; *secondly*, distension of the capillaries and the arteries proceeding to them; *thirdly*, irritative stimulus, physical and physiological, to the left ventricle of the heart, followed by more or less congestion of that chamber and the auricle, and, therefore, the pulmonary veins; *fourthly*, deficient supply of blood to the veins of all the tissues and organs, and, consequently, arterial and capillary fulness or accumulation, with venous emptiness and exhaustion; and, *fifthly*, deficient supply of blood to the right chambers of the heart and the pulmonary artery, and hence deficient supply of respired blood to the arterial system, and the several tissues and organs of the animal frame.

This unequal condition of the arterial and venous system of

the human body during fever, which extends to all the organs, is the true representation of that state which was so vaguely and imperfectly adverted to by Cullen under the denominations of *atony*, and, in the case of the brain, *diminished energy* and *unequal excitement*, to which this physician had recourse, in order to explain the occurrence of raving in fevers. This unequal excitement, we now perceive, arises from undue accumulation of blood in the arteries and capillaries, and distension of these vessels, with undue emptiness of the veins, and consequent inadequate distension of these tubes. The latter circumstance is the cause of the lightness of the head and tendency to fainting, almost invariably present, in a greater or less degree, in fever. The former, again, is the reason of the sense of distension and throbbing, of which most patients complain in the early stage of fever, before it has continued so long as to enfeeble and blunt sensibility. Both conjoined are the causes of the occasional raving and incoherence of fever patients.

The views now given also explain the exact nature of the term *Congestion*. That term has been often applied, since the distinctions introduced by Dr Armstrong, to designate a particular kind of fever, in which it is supposed the blood is unduly accumulated in the veins. We now perceive that the veins are really less distended than in the natural state, and that in congestion the blood is accumulated in the arteries. It is in consequence, however, of the imperfect capillary circulation, and the imperfect respiration already mentioned, that the blood thus accumulated is not respired and aerated, and hence assumes a dark modena colour in the vessels of the tissues in which it is accumulated, and thereby communicates to the face, extremities, and various parts of the surface, the lurid and dingy, or even bluish tint, which has given rise to this distinction.

Though I have introduced these observations in this place, they are certainly more applicable to the third and fourth forms (*Typhus* and *Synochus*) of continued fever, than to the one now under consideration. As, however, the pathological theory of simple inflammatory fever now delivered leads directly to the explanation of this state named Congestion, and as many circumstances in the one apply more or less readily to all, I think it best to complete the subject by showing its application to the doctrine of Congestion in general.

Another doctrine, on which much stress has been placed in fever by Parry and some other pathologists, that of *Increased local Determination*, requires some notice in this place. By this term, it is understood that the current of blood is made to flow with unusual force, increased velocity, and in augmented quantity, to the vessels of any given organ, as the brain, the lungs, the liver, or the intestinal tube. All authors, both systematic and practical, have placed this part of pathology in a most conspicuous light; and, however they have differed as to the acid and alkaline properties of the blood, they have all agreed in representing that fluid to be propelled with increased force and velocity during fever. This opinion is maintained by Willis and by Sydenham, by Morton and by Boerhaave, by Huxham and by Lobb, by Pringle and by Cullen, and indeed by all who have reflected on this subject. It is singular that none of these authors have adduced any proof of this increased force and velocity of the blood, and have invariably confounded the frequent cardiac contractions and arterial beats in a given time, with the rate at which the stream of blood is propelled through these tubes. It is singular, also, that Bellini and his followers, who maintained that the blood was preternaturally viscid, and contended for a degree of morbid *lento*r, did not perceive that such characters were totally inconsistent with excessive rapidity, or with any easy motion whatever.

In ordinary continued fever, I shall have occasion to remark, it is said that there is often increased determination of blood to the head; and the flushed face and injected eyes, the throbbing temples and pain of the head, are conceived to be the proofs and indications of this increased determination. I must observe, however, that the whole of this is fallacious; and that the phenomena now specified, instead of indicating increased determination, denote simply augmented resistance to the action of the heart, and the motion of the blood towards the capillary arteries, and a motion actually slower of the circulating current. I have already explained the manner in which this is to be understood, when speaking of the pathological state of the circulation in ague; and I conceive it must be admitted, as the general result of numerous physiological principles and pathological facts, that the blood is impelled neither in increased force, nor at a more rapid rate, nor in augmented quantity, to any given organ in fever.

I have already shown that the increased number of the cardiac and arterial pulse is no proof of increased velocity in the motion of the blood. It is not less clear, that the presence of resistance in the capillaries is perfectly adequate to give rise to the distension of the larger vessels and trunks. In the early stage of ordinary fever, while the disease is still uninfluenced by remedies, and unmodified by natural efforts, the arteries, especially the temporal, are much distended, while the veins are proportionally flaccid. This distension continues and increases so long as the capillary disorder continues; and it is only after the capillaries have been emptied, and allowed to contract and transmit their residual contents to the veins, and the secretions are beginning to be re-established, that the arteries return to their usual calibre, and are no longer seen elevating the integuments into distinct relief.

I have thus represented Simple Continued Fever to consist in an affection of the whole capillary system; and it may be naturally asked, what are the circumstances by which it is distinguished from inflammation? This question, I think, may be answered by the fact, that in inflammation there is conjoined to the general affection of the whole capillary system, an intense disorder of the capillaries of a particular organ. In Simple Inflammatory Fever, the impaired energy and consequent perverted action is diffused generally over the whole capillary system, without particular affection of any set or order of vessels. In Complicated Inflammatory Fever, or that which is connected with, and symptomatic of, inflammation of a particular tissue or organ, this general disorder of the whole capillary system is associated with particular affection of one tissue or organ, in which it is in general so much more intense and violent, that it is adequate, unless under the influence of artificial means, to induce temporary but complete disorganization of the affected capillaries. In Simple Inflammatory Fever the disorder is diffused, extensive, and of moderate intensity. In Complicated Inflammatory Fever, though there is an extended or diffused disorder of moderate intensity, there is also an intense and concentrated one.

Notwithstanding the justice of these principles, however, the physician often recognizes local uneasiness of a particular kind, even in simple inflammatory fever. I have mentioned in the semeiology, that the epigastric umbilical region is often

distended and tense, sometimes with, often without pain; and, in point of fact, there is in most cases an affection of the gastro-enteric organs. It is on this account that Quesnay maintained that fevers of this kind depended on some impurities in the *first* passages, that is, in specific terms, in the stomach, *duodenum*, and upper part of the *ileum*; and it is not unlikely that the same circumstance has led Broussais to deny the existence of essential simple inflammatory fever, and to maintain, that it always depends on inflammation of the gastric or gastro-enteric mucous membrane. This doctrine, however, is by no means tenable.

The theory of this condition is, I conceive, the following. In the commencement of simple fever, before the capillary circulation is very much impaired, there is no peculiar local affection; and any disorder of the gastric or gastro-enteric mucous membrane is in common with that of the other tissues. At this time the fur on the tongue is still so thin, that the *papillæ* appear as red oblong spots amidst the whitish or white-gray coating with which it is covered; and in consequence of the slight or imperceptible gastric affection at this period, Selle asserted that the white fur, if the *papillæ* were still visible, did not indicate impurities in the stomach and *duodenum*.

Afterwards, however, when the disorder of the capillary circulation has continued longer, and has become more intense, the vessels of the gastro-enteric mucous membrane share largely in the general disorder, in proportion to their anatomical extent of surface, and their physiological importance in the economy. As the extent of the gastro-enteric and the bronchial mucous surface is doubtless greater than that of the skin, and as these two membranes perform not only functions peculiar to themselves, but also functions in some degree concurrent and auxiliary with those of the skin, it is easy to perceive that the energy of their vessels cannot be impaired, nor their circulation disturbed, without seriously deranging the organic properties of their tissues, and their natural secretions, and deranging to a greater or less extent their peculiar functions. When, in the commencement of fever, the capillary vessels of both these membranes become enfeebled and unable to transmit the contained blood, they necessarily become overloaded. Their natural secretions are at first suppressed, then augmented, and entirely changed. These processes give rise, in the case of the bronchial mucous membrane, to tightness in the chest, ac-

accompanied with quickened panting respiration, and incapacity to take a deep or full inspiration.

In the gastro-enteric mucous membrane this disorder of the capillary system produces effects still more conspicuous. That membrane is at once thicker, more villous, and more vascular than the bronchial membrane, and probably, because by its functions it is constantly in contact with substances solid or fluid, it secretes mucus, even in its healthy state, more abundantly, and serous fluid, we are informed by Haller, to the amount of several pounds in the 24 hours. The first effect of the capillary disorder in fever is to diminish or partially suspend these secretions, and the next is to induce an augmented but morbid and perverted discharge. As the capillaries of the gastro-enteric mucous membrane lose their circulating powers, and become overloaded with slowly moving blood, their exhalants secrete less mucous, and gastric, and intestinal fluid than usual in the sound state, and the whole membrane falls into a state of *inertia* or atony, in which the usual doses of purgative medicines act either imperfectly, or not at all. This condition gives rise to the furred tongue, the thirst, internal heat, the loathing and lost appetite, and some of the sense of weight and oppression at the epigastric region.

As the capillary distension continues or proceeds, morbid viscid mucus is secreted from the membrane; and while its vessels secrete no gastric or duodenal fluid, or only in a morbid form, the relaxed and unhealthy mucous membrane, deprived of its gastric fluid, begins to be distended by gas, which is extricated either from the mucus, or the alimentary articles taken as food or drink, or the excrementitial remains already in the tube, and which, from the impaired tone of the muscular fibres of the stomach and intestines, is not so readily expelled as in health. This single disorder of the capillaries of the gastro-enteric organs, therefore, is adequate to induce much deranged action in the membrane, and to create much morbid secretion, which constitute the impurities adverted to by Quesnay, and which has led the sagacious Borsieri to say of continued fever,—“*Fieri interdum potest ut in ventre quidem fomitis origo sit.*” (cxvi.)

It is further manifest that this capillary disorder and its effects, accumulation and vitiated secretion, are the cause of the loaded tongue, the incessant thirst, the impaired appetite, and loathing (*fastidium*) of food, the torpid state of the intestinal tube, and the epigastric-umbilical fulness and distension,

with the occasional tenderness on pressure. This disorder, however, does not amount to inflammation, as has been erroneously maintained by Broussais and his followers; for the pain felt is evidently dependent on two circumstances,—*1st*, the mere mechanical fulness and distension of the gastro-duodenal capillary vessels, resulting from their loss of power, and the suspension of the usual secretions; and, *2dly*, distension by air extricated from morbid secretions and imperfectly digested alimentary articles.

The state now mentioned I have seen last for several days, and only disappear after the repeated employment of laxative medicines, the occasional application of leeches to the epigastric or umbilical region, and the continued use of diluents internally. Now the whole of this disorder is an affection not of the mucous membrane, but of the vascular system, in which it originates, and continues through the whole course of the disease; and it is solely in consequence of the mucous membrane being provided with vessels that it is so disordered. I must further repeat, that this disorder of the capillaries and their dependent exhalants is not confined to those of the gastro-enteric organs, but is common to every vascular tissue of the human body. In the former, however, it produces more conspicuous and remarkable effects, in consequence of the important part which the gastro-enteric membrane performs in the economy, by being the seat of the process of digestion, and in consequence of the indispensable necessity of its circulation being free, unrestrained, and healthy, to the efficient performance of that function.

It is necessary for me, before quitting this subject, to advert to an objection urged by Buffalini against the universality of this affection of the capillary system, for which I contend. This author, in an excellent work on the principles of pathology, maintains that it is impossible to imagine a morbid power, which at the same instant strikes all the points of the organic frame, and inflicts on all a simultaneous change, and he thinks it more rational to admit that the operation of noxious agents is first local at the point which it touches, and thence is diffused to others, and thus proceeds until it becomes universal.

Buffalini, however, forgets in this objection, that the morbid cause, whatever it be, really first affects one tissue or system of the organic frame, viz. the capillary, and that the disorder which it thus creates, progressively affects all those organs into which

the vascular system is distributed. It is, in short, solely by its isolated character as to organic sensibility, and by its extensive and multiplied distribution in its physiological relation to all the tissues and organs, that the capillary system performs this important part in disease, as well as in health. By its anatomical distribution in the organs, and by its subserviency to their respective functions, the capillary system cannot be injured in any way without proportionate disorder in each of the tissues in which it is distributed.

It is, therefore, quite superfluous to assume, as Broussais has done, in simple inflammatory fever, a specific and peculiar affection of the gastric or gastro-enteric mucous membrane ; or as Boisseau has done, to maintain the existence of simultaneous inflammation of the heart and vascular system, and of the gastro-enteric organs. In the cases in which the occurrence of palpitation was believed to denote a concomitant affection of the heart, it is easy to see that capillary irritation conjoined with gastric disorder was quite adequate to produce the effect in question. In short, as it must be manifest to any one who understands the anatomical distribution and physiological uses of the capillary system, that, by admitting disorders of that, we have a state quite adequate to explain the phenomena, it is altogether at variance with the principles of sound philosophical inquiry to assume the existence of a state or states which are totally superfluous.

While I thus contend for the exclusive affection of the capillary system in cases of genuine simple inflammatory fever, I do not mean to deny the possibility or the occasional occurrence of more specific and determinate local affection. Though disease is very uniform in its characters of action, and the pathologist always observes more of this uniformity as he watches its relations to separate tissues, the intimate connection of all the organic tissues necessarily facilitates the transition of morbid action from one to another, and the concomitant blending and concurrence of the symptoms of different sorts of morbid action. The general affection of the capillary system in *Synocha* may, in consequence of some particular weakness, in a certain point, or in a particular tissue, take to that a particular direction, and, without being much less violent elsewhere, concentrate in that its greatest virulence. This, however, neither indicates increased determination, nor does it prove that the pri-

mary febrile action arose from that. But it indicates that when one tissue or organ possesses feebler capillaries, or a less energetic organization, any disorder of the general system proves most noxious to that tissue or organ.

No one has taught more clearly the developement and existence of the several forms of local disorder which *Synocha* may assume than Borsieri, to whom I have on this subject so often referred. This learned physician and intelligent observer remarks, that in the genuine inflammatory fever (*Synocha sanguinea*), which affects plethoric young men accustomed to evacuations of blood or hemorrhages, at any season of the year, but especially in the spring or summer, all the symptoms may assume a formidable character, and by the blood being accumulated towards the head, throat, the pectoral, or the abdominal organs, may produce congestions simulating inflammation. Thus the circulation of the head may be intensely affected, when not only does the face become more swollen and flushed, not only are the eyes more injected with lachrymation, and the headach is more severe, but throbbing of the temples, giddiness, *coma*, and sometimes mental disorder ensue. When the lungs and heart are more particularly affected, forthwith a sense of tightness in the chest, difficulty and frequency of respiration, anxiety, palpitation of the heart, general feebleness and mental dejection are the prominent symptoms. If again, the blood overloads the vessels of the stomach, squeamishness, vomiting, or the desire of vomiting, and hiccup take place. A similar congestion of blood in the intestinal tissues causes most painful inflations, and renders the bowels constipated, or loose, with foetid discharges; and in the mesenteric arteries and branches of the portal vein, it induces fixed pain about the first lumbar vertebra, and difficulty in lying in the horizontal position. Lastly, he adds, that if the spinal chord be attacked, it gives rise to torpor, languor of the limbs, or even convulsions. Borsieri even admits, in imitation of Fernel and Sennert, a choleric or ardent fever (*Synocha choleric, vel ardens sine periodo*), distinguished by the intensity of the general heat and thirst.

Simple inflammatory fever may terminate in health, in local inflammation, in gastric fever, in nervous or malignant fever, (*Synochus vel Typhus*), or in death.

The first mode of termination is the most usual, and the ephemeral fever invariably terminates in this manner. The

second may take place, by the diffuse capillary disorder being concentrated to the vessels of a particular organ. The third occurs when the febrile process assumes a more specific direction to the gastro-enteric organs, than occurs in ordinary inflammatory fever. The fourth and fifth are perhaps not very unfrequent, since every case of *synochus* or the ordinary continued fever of this country commences with the symptoms of simple inflammatory fever (*synocha*); and it is not improbable that *synocha* passes in certain constitutions, and in particular seasons into *synochus* by insensible shades. The last mode of termination is extremely rare, and perhaps never takes place, unless by the intervention of some one of the others. It is on this account not easy to specify the exact anatomical characters of this species of fever, if a disease which consists more in impairment and perversion of properties than mechanical lesion, can be said to possess anatomical characters. The foregoing view of its pathological nature, nevertheless, I have deduced from several carefully observed examples of the disease in the living body, combined with, and rectified by, the evidence afforded by the traces left in all the organs in cases of symptomatic inflammatory fever. By separating these from the local disease, we are enabled to form some idea of the general disorder.

§. III.—TREATMENT.—The pathological principles now stated will enable the physician to perceive what kind of treatment is required for the removal of this disease. Sound theory would suggest that the great indication in the management of simple inflammatory fever is to restore the capillary vessels and the secretions to their healthy state. This, however, it is impossible directly to accomplish, since we possess no means of operating directly on that order of vessels, and we know no remedies which can restore to these vessels the faculties which have been temporarily impaired or lost. The object, however, which cannot be attained by direct means may be effected indirectly.

In slight cases of inflammatory fever, and especially in the ephemeral variety, it has been already observed, that the system possesses in itself a tendency to produce a spontaneous termination in health,—that is, that the capillaries possess sufficient energy after a few hours or days of perverted and impaired action to recover themselves, to contract on their contents, to

propel the blood into the veins, and to re-establish the different secretions.

As it has been ascertained by experience that this change takes place most readily, when all sources of irritation are withdrawn, and the organic tissues are allowed to rectify themselves, the treatment of this form of fever, in the circumstances now specified, is to be limited to the removal of all those causes which tend to aggravate the symptoms. These, which are what Whytt, Cullen, and other pathologists, have denominated *irritations*, comprise all impressions on the external and internal senses, exertion of the corporeal organs, mental efforts, exposure to the vicissitudes of the weather, food, drink, and all those agents which act as *stimuli* of the vital organs. The first duty of the physician, therefore, is to withdraw immediately all causes of this description, and to prevent their operation, or counteract its effects as far and as completely as possible. The whole of this is comprehended in the three requisites, of rest, in the horizontal position, a quiet chamber, and low diet, with the use of watery liquors for drink; and in general, under such circumstances, ephemeral inflammatory fever, uncomplicated with local disorder, manifests a tendency to subside spontaneously.

In cases of *Synocha*, however, in which the febrile process is more intense, and of longer duration, a more active method of procedure is requisite. It is then incumbent to attempt to restore the healthy state of the capillary vessels and the secretions by the administration of;—1st, remedies which operate on the circulation and secretions; 2d, remedies which act on the alimentary canal; and 3d, remedies which act on the cutaneous and renal secretions.

1st, *Remedies which operate on the circulation and secretions.*

In *Synocha*, and indeed in all forms of fever, it is manifest that the powers of the capillaries are diminished and enfeebled relatively to the mass on which they have to act. The quantity of blood remains the same; but, as the vessels are in a temporary state of atony and debility, they are unable to propel it, or perform the functions to which, in the healthy state, they are adequate. Though we cannot augment the powers of the vessels, we have it in our power, by diminishing the mass they have to move, to accommodate the duty to be performed to the existing strength. Though they are unable to move the

whole, they may contract on a part; and hence, if the whole be diminished, the residue may be more readily circulated. By withdrawing blood, either from the system or locally, we place the powers of the capillaries and the mass of the blood on a footing of more equal proportion, and enable the former, when relieved of the inordinate load by which they are distended, to recover their contractile properties, and promote the motion of the fluid.

The measures thus suggested by physiological considerations are found to be therapeutically beneficial. Blood-letting, when performed in inflammatory fever, has the effect of rendering the cardiac and arterial pulse slower and fuller, and less tense and oppressed, of abating the panting and frequency of respiration, allaying the heat of the skin, and rendering the system generally more impressible by other remedies. Accordingly, no doubt appears at any time to have been entertained regarding the propriety of this remedy in the treatment of inflammatory fever. In the ephemeral form, indeed, it is unnecessary; for the disease terminates spontaneously in the course of the second or third day. But when the disease is protracted beyond this time, or if the intensity of the symptoms, as the rapidity and tension of the pulse, the flushing of the face, general heat and uneasiness, give reason to believe that the disease is genuine *Synocha*, the best and most certain means of cutting short its career, or mitigating its violence and bringing it to a favourable termination, is the abstraction of 12, 20, or 30 ounces of blood according to the age, habit, and strength of the patient, and the effect produced. "In cases of *Synocha*," says Cullen, "blood-letting is the principal remedy, and may be employed as far as the symptoms of the disease may seem to require, and the constitution of the patient will bear." (140, p. 112.)

Blood-letting, however, is always most effectual when practised at the commencement of the disease; and it not only becomes less efficient, but may even be injurious, when the malady is far advanced. At that period, not only is the blood so long fixed in the capillaries that it is difficult, by merely emptying the veins, to elicit the blood from the former, and empty them also, but as the veins are, from the same cause, at this stage of the disease, much less distended, and may even be partially exhausted, depletion from them may be highly injurious by withdrawing

too suddenly a supply of fluid which is not replaced with sufficient promptitude.

At this period, therefore, a safer and more efficient mode of depleting the capillaries is by means of local bleeding by leeches or cupping, or even the derivative powers of blisters. Leeches applied to the epigastric region are particularly well adapted to most cases of continued fever, and tend, by the local evacuation, to diminish the epigastric-umbilical weight and distension, and to facilitate the operation of other remedies.

In general these evacuations, with others now to be mentioned, will control the violence of the symptoms so far as to promote the spontaneous termination of the disease. But if the pulse continue to rise a little in the evening, accompanied with heat and flushing, and if the tongue be still covered by a white viscid fur without any appearance of the *papillæ*, leeches should be again applied or a blister upon the epigastric region.

Of the remedies which act on the alimentary canal and its secretions, emetics and cathartics are the chief.

It was at one time the general practice to exhibit emetics for the treatment of fever; and under proper limitations, they are powerful and useful remedies. Cullen, who studied the subject with peculiar interest after the observations of Lobb, Bryan Robinson, and Huxham, maintained that vomiting was useful by evacuating the contents of the stomach completely, and those of the *duodenum* and upper part of the *ileum* partially, by emulging the biliary and pancreatic ducts, by agitating the abdominal and even thoracic *viscera*, and promoting the motion of the blood in their vessels, and especially by operating on the muscular fibres of the stomach, and thereby, as he imagined, exciting the action of the capillary vessels of the surface, impelled the blood to these vessels, and removed the atony and spasm, with which he conceived they were affected.

These views are partly well-founded and partly hypothetical; but as the hypothesis to which they were adapted is erroneous, they require some modification. The physiological effects of vomiting are certainly to unload not only the contents of the stomach, duodenum, and upper part of the ileum, but also the vessels of the stomach and duodenum, and to create a flow of serous or sero-mucous fluid into their cavities. It is also one of the physiological effects of emetics in nauseating doses, that, by lessening the irritability of the muscular system,

impairing temporarily the force of the action of the heart and arteries, and relaxing the capillaries and exhalants, they may partially unload the latter, and in this manner tend to mitigate the symptoms and shorten the duration of fever. It is further well ascertained by observation, that certain emetic medicines, when given in doses so minute as scarcely to excite nausea, for instance emetic tartar, (tartrate of antimony and potass), exert so powerful an influence on the capillary system and its dependent exhalants all over the body, that, if the surface be kept warm, they operate on the skin and bronchial membrane, producing sweating and expectoration; if the surface be kept less warm, they operate on the intestinal tube, and produce numerous loose stools; and if the surface be kept still cooler, they add to this effect that of exciting the action of the kidneys.

The knowledge of the physiological effects of emetics is requisite to guide us in obtaining their therapeutic effects, whether given to produce vomiting, or in the minute doses which operate on the capillary circulation and secretion.

In the first case, it has been ascertained by experiment, that vomiting excited at the invasion of fever is often adequate to cut it short entirely, and in all cases mitigates the violence and danger of the subsequent symptoms, and abridges the duration of the disease. The commencement, therefore, of inflammatory fever is the best season for the administration of this remedy; and if the patient is not then seen, it is inexpedient, unless where there are evident symptoms of indigestible matters, or much viscid mucus in the stomach and duodenum. The best form of emetic at this time is a scruple or a scruple and a-half of ipecacuan, with a grain of tartarized antimony.

Minute or nauseating doses of emetics are less limited in their application, and may be given at any period in the course of inflammatory fever. A solution of emetic tartar, in the proportion of one or two grains in eight ounces of water, may be given in doses of a dessert spoonful, or even half an ounce every hour, until either the bowels become loose, or the skin is moist, or the general febrile symptoms are abated. The antimonial powder is less certain in its operation, and is most frequently conjoined with calomel, when its effects both on the bowels and skin, and the secretions in general, are more decided and curative.

A patent antimonial medicine, named James's powder, from

its preparer, Dr James, has been long celebrated in the treatment of fever. As the physiological and therapeutic effects of this preparation are well known, though its composition is kept secret, physicians have not scrupled occasionally to administer it in cases of fever; and I have both seen this medicine given, and given it myself, in cases in which I conceived its employment was indicated. Given in the usual dose of seven grains, or one-third of the prepared packets, it sometimes produces no sensible effect, and sometimes is followed by moisture of the skin and abatement of the febrile heat, or occasionally by a full discharge from the bowels. If repeated, it generally produces squeamishness, sickness, and numerous loose stools, with moisture of the skin, but a deadly sickness and faintness, with great exhaustion of the whole system. If another dose be given, the symptoms are aggravated, and it may happen, that, by the profuseness of the evacuations, the system is brought into a state favourable for the cessation of the capillary disorder, on which the fever depends. In some instances, however, these evacuations, and especially the specific effect of the medicine, induce such a degree of feebleness in all the vital actions, that the organs are unable to maintain their vital power, and death takes place apparently by exhaustion. It is on this account that James's powder, with probably no greater curative powers than any other antimonial, is a medicine which is always to be given with hesitation and caution; since, if it does not prove curative, it is too liable, if repeated or given copiously, to cause injury.

The employment of purgative medicines is not only less objectionable, but is in every respect more advantageous, and particularly necessary. In inflammatory fever, in common with others, not only is the capillary disorder of the intestinal tube a cause of constipation, but the latter proves to the system a source of general irritation, which aggravates all the symptoms. The most effectual mode of counteracting this result, is the early exhibition of such eccoprotic medicines as may effectually empty the intestinal tube, and the frequent repetition of those laxatives which prevent subsequent accumulation of its excrementitious contents. The advantage of these remedies consists in keeping the intestinal canal as nearly as possible in a healthy state,—obviating the tendency to unhealthy secretion, which uniformly attends fever,—in removing its products, if there be morbid secretion,—and in causing from the mucous surface of the intestines a discharge, which

allays the general heat, and abates the capillary distension. The indications for the exhibition of laxatives and purgatives are to be derived from the appearance of the fur on the tongue, the degree of fulness and distension of the epigastric-umbilical region, the sense of weight referred to that region by the patient, and the appearance, existence, and figure of the matters discharged from the bowels. In general, it is necessary to administer an active eccoprotic at the commencement of the attack, and to repeat the use of laxatives, so as to procure one, two, or three motions daily, according to the symptoms of the patient and the relief afforded. The choice of a purgative is not altogether a matter of indifference. In general, it is desirable to begin with those which effectually empty the lower part of the intestinal tube, as the aloetic or colocynth pill, castor oil, the laxative electuary, or the compound powder of jalap. Afterwards the purgatives which act on the whole tube, as calomel, either alone or with jalap, or extract of colocynth, or the neutral salts may be advantageously employed. The black draught is a form which combines both objects. The formulæ at the end of the volume will give the requisite pharmaceutical details.

In some instances it is desirable to combine with purgatives the use of the divided or nauseating doses of emetics. I have already mentioned the combination of calomel and the antimonial powder, or even James's powder. Another useful form of combination is the antimonialized saline solution, consisting of one ounce or an ounce and a-half of Epsom salts dissolved in water, with a grain or a grain and a-half of emetic tartar, which invariably procures numerous copious liquid evacuations.

Of the remedies which act on the cutaneous secretion, the ordinary emetics, either alone, in nauseating doses, or conjoined with opium, are the most common. Thus half a scruple or a scruple of the compound powder of ipecacuan, or half an ounce of the antimonial solution, with opium, may be given occasionally till sweating is produced. This practice, however, though at one time common, has been less frequent of late years; and it must be regarded as injudicious to administer, in the early stage of fever especially, medicines containing opium, which too often augments heat and thirst, always constipates the bowels more or less, and occasionally masks and disguises the morbid action.

The best and most effectual mode of rendering the skin cool and moist, is to rectify the state of the alimentary canal by means of purgatives, and to exhibit copiously the cooling acidulous drinks, or even cold water. If it is wished to effect this purpose medicinally also, then to the administration of purgatives may be added that of the saline mixture (*citras potassæ*,) spirit of *Mindererus* (*aqua acetatis ammoniæ*,) imperial or cream of tartar water, lemonade, orangeade, apple-tea, or a dilute solution of *capillaire* (*syrupus dianthi veneris*,) or any aqueous solution, in short, of the subacid fruits.

Tepid washing, or the tepid bath, at about 82° or 86°, fomentations of the feet and legs, with flannel cloths wrung out of hot water, or even the occasional use of the cold affusion, are likewise valuable diaphoretics.

The urinary secretion in general returns in its usual quantity, and acquires the natural transparency as the fever subsides; and until the capillary disorder is subdued, this does not take place. Diluents are the chief means which, next to blood-letting and purgatives, favour this termination; and the ordinary ptisans, as toast-water, barley-water, water-gruel, either alone or acidulated with any of the vegetable acids, may be employed for the same purpose. The medicines by which this indication is most usually fulfilled in continued inflammatory fever are the acetate of potass, nitrate of potass, or the sweet spirits of nitre. The effervescing draught, which is useful not only as a refreshing drink, but as a diuretic, and occasionally a gentle laxative, may also be used. Of the same character also are the Seidlitz powder, soda water, ginger beer, or common brisk beer, all of which are useful in exciting gently the vessels of the stomach, displacing wind, and allaying internal heat.

The diet during the treatment of inflammatory fever ought to consist entirely of vegetable matter, as arrow-root, sago, panado, or water-gruel, with a little milk or whey. Excepting milk, indeed, diluted with water, or whey, both of which are useful both in quenching thirst, and affording sufficient nourishment without stimulating the blood-vessels, no animal matters ought to be allowed. The weakest soups are injurious, so long as the tongue continues furred, and there is any thirst or cutaneous heat. Tea and coffee are useful as safe temporary stimulants.

SECTION II.—FEVERS IN WHICH THE DERANGEMENT OF CIRCULATION IS CONNECTED WITH DISTINCT DISORDER OF ONE OR MORE VITAL ORGANS, AND A TENDENCY TO DISORGANIZATION OR DISRUPTION OF THE CAPILLARIES.

GASTRIC, GASTRO-SPLENIC, OR GASTRO-ENTERIC FEVER.

A. WITH DISORDER OF THE STOMACH OR SPLEEN, INTESTINAL TUBE OR LIVER.

Febris Gastrica, Ballonii; *Febris Mesenterica*, Baglivii; *Morbus Mucosus*, Roederer et Wagler.

Ballonii, Opera, 1734–36, Tom. iii.—Baglivi, Opera, 1704.—Arnoldi, *Dissertatio de Febre Stomachali Epidemica*. Marburgi, 1727.—Schenbecker, *Dissert. de Febre Stomachica Intestinali*. Argent. 1760.—Roederer et Wagler, 1762.—Wienholt, *Dissert. de Inflammationibus Viscerum Hypochondriacorum Occultis in Febribus Biliosis Putridis*. Gotting. 1772.—Born, *Dissert. de Febre Gastrica Putrida*. Gotting. 1784.—Charleville, *Dissert. de Febre Gastrica Symptomata*. Halæ, 1785.—Doering, i. p. 114.—J. P. Frank, *de Larvis Morborum Biliosis*. 1784.—Hempel, *Disquisitio quatenus Cacoehylia sit causa Februm*. Gotting. 1789.—Doering, i. p. 184.—Wedekind, *de Morborum Primarum Viarum Vera Notitia et Curatione*. Norimb. 1792.—Gramberg, *de Vera Notione et Cura Morborum Primarum Viarum Comment.* Erlang. 1793.—Nicolaï Treiber, *Dissert. de Febribus Gastricis*. Jenæ, 1795.—Domling, *Dissert. Morborum Gastricorum Acutorum Pathologia*. Wisp. 1797.—Lentin, *Momenta quædam Generaliora circa Febris Gastricæ Distinctionem et Medelam*. Gotting. 1798.—Hecker, *Dissert. de Febre Gastrica*. Erf. 1800.—Authenac, *Essai sur l'Ideologie, la Technologie, la Nosographie, et la Medicographie des Fievres Gastriques Simples*. Paris, 1804.—Journal de Med. Cont. Vol. ix. p. 300.—Desains These soutenue sur la Fievre. Meningo-gastrique. Journal de Med. Cont. Vol. iii. p. 146.—Gayetant These soutenue, &c. ibid.—Richter, *Darstellung der Gastrischen Fieber*. Halle und Berlin, 1812.

Though in all fevers there is always more or less affection of the gastric, gastro-hepatic, or gastro-enteric organs, yet in some this disorder is so considerable as to assume a prominent place, and obscure very considerably those of the other functions. This remarkable affection of the gastric, intestinal, or hepatic organs, appears to have first attracted particular attention from Baillou, who had observed in the fevers prevalent in Paris, that in certain seasons the disorder was so considerable as to obscure that of the vascular system generally; and to this form of fever, accordingly, he applied the denomination of *Febris Gastrica*. Fevers with a similar prominent affection of the intestinal tube were observed by Baglivi between 1702 and 1704, and denominated by him mesenteric fevers. Heister also remarked a variety of fever, to which he gave the name of

intestinal; and a similar febrile condition was denominated choleric by Hoffman. From the accounts of the *morbus mucosus* of Roederer and Wagler, and from those of Arnoldi, Born, Lentin, Authenac, and Richter, it cannot be doubted that in certain seasons and particular countries the general characters of febrile diseases may be very much modified by a disorder more or less distinctly and forcibly concentrated upon the gastric, the splenic, the intestinal, or the hepatic vessels, separately or jointly.

From the accounts of the best practical observers it may be inferred, that these different forms of febrile disorder pass into each other by insensible shades; that in one person, during the same epidemic, there may be an affection of the stomach, distinguished not only by weight and tenderness at the pit of the stomach, with fulness and tension of the epigastric region, but extreme sickness and occasional vomiting; that in another, these symptoms may be accompanied with pain and weight in the right side and bilious vomiting; and that in a third, the symptoms of fever may be evinced principally by *tormina*, *tenesmus*, wandering pains in the belly, with a sense of fulness and distension and frequent mucous stools.

These different forms of disease will constitute the varieties described by practical authors, under the names of gastric fever, gastro-hepatic or bilious fever, and intestinal fever. The enteromesenteric fever of Petit and Serres, in which the aggregated glands of the intestine are affected, must be regarded as an intense form of the latter disease, or as fever taking place in persons who have previously laboured under *dothineritis*.

I am inclined, therefore, to distinguish this form of fever into three varieties, the gastric, or gastro-splenic, the gastro-hepatic or bilious, and the enteric, or intestinal, according as the symptoms indicate a more or less distinct disorder of the stomach, spleen, and *duodenum*, the stomach, *duodenum* and liver, and the *ileum*.

In the first form of fever, or that denominated gastric fever, the presence of the disease is indicated by great loss of appetite, squeamishness, loathing of food, and a sense of weight, oppression, and painful tension at the epigastric or epigastric umbilical region, with flatulent eructations, which afford little relief. The state of the tongue is variable; being sometimes covered with a viscid fur, sometimes red, but extremely dry, with considerable thirst, and a bad taste in the mouth, which feels as if it was

lined by an adventitious coating. The pulse is not always quick ; often it is natural in frequency,—a circumstance which depends on the fact, that in disorders of the mucous surfaces the number of cardiac contractions is not generally augmented. As the disease advances, however, it becomes more frequent, and after it has continued for a fortnight or three weeks, it is rarely under 100 or 112. In general the pulse is soft and feeble, and if it become hard this change may be attributed to an affection of some other organ, or to the transition of the morbid action from the mucous to the submucous tissue. The respiration is very rarely affected.

The most remarkable character of this disease, however, is the extreme languor, faintness, and feebleness, which is totally disproportionate to the apparent affection of the other functions. The patient feels himself quite unable for any exertion either of body or mind ; and this, with the other effects of the fever, renders him spiritless and despondent, and gives the countenance and eye a peculiarly haggard and forlorn expression.

The epigastric and the umbilical region are more or less distended ; and not only does pressure give considerable pain, but the patient complains of a constant sense of tenderness and uneasiness, which nothing is adequate to remove.

According to Arnold, there is even redness and inflammation to be seen externally at the pit of the stomach and towards the left side, with tenderness so constant and acute that the patients cannot endure the part to be touched. This, however, must not be always expected ; and in many instances the epigastric region is so free from pain that pressure is borne with little difficulty. It is requisite to observe also, that patients sometimes refer this pain to the breast,—a circumstance by which the physician ought not to be deceived.

In short, so far are these symptoms of pain or uneasiness at the epigastric region from being distinctly evinced, that in some epidemics the disease has been known to proceed from its origin to its termination without giving rise to manifest local uneasiness ; and Wienholt has shown that in many instances, the morbid action, whether of the character of congestion or inflammation, as it is named by him, may be so completely latent as to escape notice.

Spigelius indeed mentions, that, in malignant continued fevers which were evidently of the same character as this, he found

the inner surface of the stomach marked by livid spots in several places, and the small intestines inflamed and sphacelated, though the patients had never complained of pain. Hoffman also describes a fever which he denominates malignant, in which he found the *viscera* inflamed and sphacelated after death, yet without being indicated by any corresponding pain during life; and Malouin describes two epidemics at Rouen in 1753, in which, without any previous indication except tension of the belly, he found the intestinal villous membrane covered with a gelatinous crust, and presenting in various parts spots of inflammation and ulceration.

Similar facts have been observed by Frank, Prost, and more recently by Petit and Serres; and they lead to the irresistible conclusion, that inflammation of the gastric or intestinal mucous membrane, or of their glands, may exist and proceed to ulceration without their presence being indicated by any external painful sensation.

The same fact was also remarkably confirmed in the disease which, in 1822, arose and prevailed in the General Penitentiary at Milbank. Though the stools were very frequent in this disorder, and the sense of mortal sinking was general and irresistible, yet in many cases in which the disease proceeded to the fatal termination without pain of the belly, it was found after death that inflammation and occasionally ulceration of the mucous membrane had taken place. Similar facts are observed daily in other diseases.

Lastly, Mr Poole remarks, that in the gastric fever which prevailed epidemically in the 32d Reserve and 83d Regiment, when stationed at Limerick, no tenderness or uneasiness existed at the epigastric region, or indeed in any part of the abdomen. (Medical and Surgical Journal, Vol. xli. p. 32.)

The bowels are generally slow, and with difficulty moved by medicine; but if the disease be neglected in the beginning, it almost invariably terminates in very bad or uncontrollable diarrhoea.

The skin is invariably dry, harsh, and imperspirable; and the patient is much more sensible to changes of temperature than in the state of health.

The state of the biliary secretion can be determined only by the administration of cathartic medicines; and, in general, stools produced by their operation present either a small quantity of

crude, dark-green bile, with a large proportion of mucus, or a quantity of dark-green undecomposed bile.

The urine is scanty, and of a dark-red colour, emits a rank smell (*jumentosa*), and deposits, upon cooling, a copious brick-dust sediment. According to Arnold, this sediment does not appear till after the fourth day.

In the epidemic described by Born, and which occurred at St Petersburg in 1783, a very common and uniform symptom was pain of many joints, but especially those of the hands, and similar to general rheumatism; and he states, that, when he was labouring under this fever himself, all his limbs were so acutely painful that he could not endure any one to walk across his chamber, and grasping his hand in the ordinary mode of salutation made him scream with pain. The abdominal muscles were often affected with spasm, so as to render the belly as hard as a board; and the *recti* were often contracted like a rope.

The state of the intellect and the moral affections varies in this fever. I have already mentioned the despondent and spiritless condition of most patients. In general, at the commencement of the disease the head feels heavy and even sore externally; and the patient is so faint and giddy that he cannot bear the erect posture. As the disease advances, the patient becomes sleepless and restless, or his nights are disturbed by frightful dreams, and more or less delirium ensues. In other instances, however, the mind is little affected.

The second variety of the disease, or the *gastro-hepatic*, is chiefly distinguished by the presence of occasional bilious vomiting, the pain and tension being more marked in the right hypochondriac region, and the conjunctiva and surface being tinged by a brass yellow suffusion. Occasionally it terminates in bilious diarrhœa.

In the third, or *gastro-enteric* form, the chief characteristics consist in the occurrence of numerous mucous or sero-mucous stools causing a sort of slimy diarrhœa, evidently induced by the irritation and inflammation of the intestinal mucous membrane and its glands; (*blennorrhœa intestinalis*.)

It is necessary to observe, however, that there is in general the same feebleness of the muscular powers, and sense of sinking and debility, and sometimes the same weakness and disorder of the intellectual functions.

According to Wagler, to whom we are indebted for the most

accurate account of the morbid anatomy of this disease, the mucous membrane of the stomach and intestines, especially the latter, was covered with a thick, viscid mucus, which could scarcely be detached. Beneath this layer were the mucous glands manifest, which in the healthy state are scarcely visible. They were in many parts prominent, swelled, enlarged, and internally filled with viscid mucus. Their excretory canals were enlarged, and became visible to the eye. This condition was most manifest in the stomach and *duodenum*, less so in the parts remote from the *duodenum*. Some of the mucous glands in the *colon* were surrounded with a red *areola* or ring; and inspection by a magnifying glass showed that their membrane was filled with very delicate vessels, inflamed and ecchymosed. The substance of the bowel was thickened, and it had a blue colour, in consequence of inflammation, especially the villous membrane. In the *colon* were found mortified spots, as is seen in dysentery. The liver had in general a granular aspect. The spleen was in general preternaturally large, softened, and lacerable in substance, and much congested,—in one instance traversed by minute abscesses.

§ II. ETIOLOGY AND PATHOLOGY OF GASTRO-ENTERIC FEVER.—The causes of *gastro-enteric* fever are not very well ascertained. If, however, we consider the history of different epidemics, there is reason to conclude that the disease depends either upon atmospherical causes, or upon local peculiarities, or on both combined.

In the first place, it seems to be more common in certain districts and countries than in others, and these districts are in general such as give rise to intermittent and remittent fevers.

Thus gastric fever has been observed by Baillou, Prost, Petit and Serres, to prevail in Paris; by Baglivi and various other authors to prevail at Rome, and Ramazzini at Modena. The gastric fever described by Arnold prevailed for about three seasons epidemically, between 1723 and 1726 in Westphalia, and was preceded by two rainy seasons. The *morbus mucosus* of Roederer and Wagler began in the year 1761 at Goettingen in the month of January, while the weather was wet and cold with much rain and snow, increased in February, was in April accompanied with intermittents, and only terminated in the summer months of June and July. It was, however, also ascribed to the circumstance of an unusually dense population fed upon very bad and scanty food, in consequence of French

troops and their attendants, to the amount of 8000 being stationed in the city during a period of war. Born also remarks, that, though gastric fever is more frequent in wet marshy soils than in dry situations, yet it was much more frequent for several years successively after an inundation than previously. A bilious pituitous fever, which prevailed in various parts of Hesse, from the beginning of December 1783 to the end of August 1784, was preceded by great heat and dryness of the summer of 1783, and very heavy autumnal rains in September, October, and November ; and, according to Schröder, to whom we are indebted for the description of this fever, it was first and most severely prevalent in the canton of Udenhausen, in which the waters had been accumulated from the higher grounds, and in which also the atmosphere was exceedingly moist and foggy. Its prevalence, also, in Ireland, in situations where no marshes are found, and its greater prevalence in certain seasons than in others, shows its connection with atmospherical causes.

Secondly, it appears, nevertheless, that gastric fever is much more prevalent in situations where the inhabitants live on indigestible articles of food. Thus both Arnold and Born, and also Frank, observe that gastric fever is very liable to be induced in those who make great use of salted fat bacon, cheese, unripe fruits, badly-baked bread, and imperfectly fermented liquor. It is also very liable to be brought on when spirituous liquors are employed with the view of correcting these qualities. From the testimony of Arnold and Born there is no reason to believe that it is ever contagious.

In the *third* place, it appears, that, though gastric fever occasionally occurs at any season of the year, it is most frequent during the months of summer and autumn. The pituitous form of gastric fever, however, occurs also during spring. The bilious-pituitous fever described by Schröder in Hesse prevailed between the beginning of December 1783 and the close of August 1784.

In the *fourth* place, though it may attack persons of any rank of life, and of both sexes, it is most usually observed in peasants, reapers, and other inhabitants of agricultural districts exposed to the sun, and in soldiers in encampment and barracks.

In the *fifth* place, it is observed, and is much more likely to appear after direct exposure to cold and moisture than at any other time.

Some doubt may be entertained with regard to the genuine type of this fever. In general, in whatever situation it occurs, it is continuous without any very manifest remission; and if there is remission, this occurs at an uncertain period, and very rarely. I must observe, however, that the mesenteric fevers of Rome described by Baglivi, though continuous, are allied to the remittent type; that the mucous disease of Goettingen, described by Roederer and Wagler, made a near approach to the character of the *hemitritaeus*, or semitertian remittent, and that it was preceded by agues, assumed an intermittent character in the month of May, and was followed by agues; that the bilious-pituitous fever of Schröder evinced also occasionally a remittent character; and that the gastric fever occurring in Vienna generally betrays the same character. In some parts of Germany, on the contrary, the symptoms which this form of fever presents have made it be referred to the head of Typhus, under the name of abdominal or intestinal Typhus.

The symptoms conjoined with the morbid anatomy of this disease may serve to illustrate its pathology. It may thence be inferred, that, though there is a disorder of the capillary vessels at large, there is at the same time a particular morbid condition of the capillaries concerned in the circulation and the secretions of the stomach, *duodenum*, and *ileum*, and of the liver, and perhaps even of the spleen and *pancreas*. What is the exact nature of this morbid condition it is not very easy to say, as we have direct proofs only of its effects. But, from the analogy of other morbid states, and from what we know of the healthy state of the circulation of the alimentary canal, I infer that the capillaries of these organs are smitten in different degrees with a loss of power, in consequence of which they are unable longer to continue the healthy secretion, or to contribute to the different secretions which are performed on the mucous surfaces of these organs. Hence the stomach and *duodenum* either secrete little or no gastric fluid, or in a morbid form only. The liver secretes an imperfect bile. The pancreatic secretion is also perverted or deranged, and the intestinal mucous membrane and its glands in like manner cease to secrete their proper fluids.

It is to be remembered also, that the gastro-enteric villous membrane, though designated mucous, does not in the healthy state secrete mucus, properly so called. The moment, however,

that the derangement in circulation and secretion now mentioned, takes place, the whole of that membrane becomes first comparatively dry and thick, and then secretes a tenacious viscid mucus in great profusion, which is either not digested, and undergoes partial fermentation, giving rise to the formation of gas, or, after producing squeamishness and sickness, is rejected by vomiting, or expelled by diarrhœa.

This secretion, together with the distension of the capillaries, from which it originates, gives rise to the swelling, weight, and distension of the epigastric and umbilical regions; the capillary distension is also the cause of the tenderness and soreness upon pressure; and it is easy to see, that, while such a process is going on in the gastro-intestinal mucous membrane, neither can digestion be performed, nor can the liver and kidneys perform their usual functions. The derangement of the gastro-enteric capillary circulation, indeed, necessarily deranges that of the portal vein, since the blood, not being transmitted with the same facility as in health through the capillaries of the stomach and intestines, is prevented, consequently, from flowing with the same facility into the trunk of the portal vein, and, consequently, is not distributed in due quantity and quality through the liver. There is also reason to believe that the blood does not pass with sufficient facility through the capillary divisions of the hepatic artery, and that, consequently, the circulation of the liver is deranged, not only directly but indirectly.

There is still, however, another organ, the state of which has the greatest influence upon the phenomena of gastric fever. This is the spleen. It may be regarded as well ascertained, both by considering the anatomical distribution of the splenic vessels and the structure of the spleen, and the respective changes which take place in that organ when the stomach is full and when it is empty, that the blood flowing through the splenic artery is not intended to be appropriated to the spleen alone.

It is an anatomical fact, indeed, that not only does the stomach receive a large direct branch from the splenic artery, which anastomoses freely with an analogous or similar branch from the hepatic, but numerous clusters of small vessels pass directly from the spleen into the cardiac region of the stomach, and, ramifying through the tissues of that organ, contribute mainly to the secretion of the gastric fluid. The properties of these

vessels are greatly impaired, and their circulation is necessarily perverted and disordered during gastric fever; and as the blood does not circulate readily through them, but becomes dark-coloured, and loses its fluidity, a degree of congestion is produced along the whole of these vessels backward to their trunks, and also to the communicating vessels distributed through the substance of the spleen. Many instances of gastric fever, indeed, proceed from previous derangement of the splenic circulation.

The duration of gastro-enteric fever depends upon the treatment, upon the character of the season, the nature of the epidemic, and upon the constitution of the patient. Under favourable circumstances, and by proper treatment, it may terminate favourably at the end of the fifth, the seventh, or the fourteenth day. If the disease proceeds beyond this period, it is liable to assume the character of a slow wasting hectic, with mucous diarrhœa, alternating with colliquative sweats,—a change which seems to depend upon inflammation, suppuration, or even ulceration of the aggregated follicles of the intestines. Ulceration of these glands is not, however, in every instance, requisite to give rise to the phenomena now mentioned; for recovery from this state has been effected; and when the patients have subsequently died of other diseases, the intestinal follicles have been found merely unusually distinct, enlarged, and congested. Gastric fever is said also to terminate in dropsy, chlorosis, enlargement of the mesenteric glands, worms and atrophy. But these vague denominations may be shown to be applicable strictly to effects produced by the dothineric affection. If the ulceration continues, it may terminate in *gastritis*, *enteritis*, or *peritonitis*.

§ III. TREATMENT OF GASTRIC FEVER.—In the treatment of gastro-enteric fever, the principal object to be held in view is to abate the capillary congestion, to allay the irritation of the gastro-enteric mucous membrane, and to restore the circulation to its natural channels. This may be effected by various agents.

General blood-letting may be conceived to be requisite, in order to relieve the gastro-enteric capillaries of their inordinate load of blood; and, if practised early in the disease, it is oftentimes beneficial in diminishing the epigastric weight and tension, and abating the painful sensation felt in that region, and also in checking sickness and diarrhœa. It sometimes happens, how-

ever, that patients labouring under gastric fever do not well bear blood-letting from the arm, and that this evacuation does not exercise over the morbid process a therapeutic influence proportionate to its enfeebling effect. In these circumstances, the local detraction of blood from the epigastric or umbilical region, or from the left hypochondriac, corresponding to the site of the spleen, by means of leeches, is the appropriate remedial measure. This should be repeated so long as the sense of weight and tension, with the fulness and pain of the epigastric and umbilical regions continue, or, if these symptoms be absent, so long as sickness and faintness are complained of, and while the stools are preternatural in frequency and in characters.

With the same view counter-irritation by blisters, or tartar-emetic ointment on the belly, may be advantageously employed.

Emetics were employed in the treatment of gastric fever by Arnold, Born, and various other authors; and they are recommended in the early and recent form of the disease by Hildenbrand and by Frank. They are chiefly indicated when the stomach and intestinal canal are loaded with viscid mucus, when the skin is hot and dry, when there is a sense of weight and fulness in the epigastric region, and when there is much mucous diarrhœa. In general their operation is most effectual after blood-letting from the arm, or the discharge of a few ounces of blood from the epigastric region by means of leeches.

It is necessary at the same time to empty the intestinal tube by laxative medicine. The use of energetic or drastic purgatives has been condemned by several in the treatment of gastric fever; and, in point of fact, the administration of these remedies is entirely unnecessary. What is requisite in gastro-enteric fever is merely to remove gently but effectually, morbid secretions, and to prevent the accumulation of feculent matter, bile, or viscid mucus; and this is easily attained by the eccoprotic laxatives. For this purpose, small doses of cream of tartar and preserved tamarinds, small doses of sulphate of magnesia, or phosphate of soda, or the tartrate of potash and soda, are generally sufficient. If the more violent purgatives be given they are merely involved in the mucus of the stomach and intestinal tube, and operate only partially, producing *tormina* and fluid stools. In general, even, it is desirable to begin the process of clearing out the bowels by glysters, after which the mild eccoprotics act with greater facility and certainty; and it is a great advantage of this method of emptying the bowels that

it may be used during the whole course of the disease without injury, and with the certainty of producing much benefit.

Calomel is recommended in the treatment of gastric fever by Hildenbrand; and it may be useful in certain cases previous to glandular ulceration. Frank condemns mercury in every shape; and I believe it is from the circumstance now mentioned that it is injurious.

Minute doses of tartrate of antimony are also found useful in relieving the capillary congestion and relaxing the skin.

When the prominent symptom of the disease is diarrhœa, either mucous or feculent, opium, either alone or with ipecacuan or acetate of lead, is extremely beneficial. In the case of the former combination a scruple of Dover's powder should be given at bed-time, and half an ounce or six drachms of castor oil the following morning. In the case of the latter combination a pill, consisting of one, two, or three grains of acetate of lead, with half a grain or a grain of opium, may be given twice or three times daily, according to its effects upon the symptoms and the functions of the patient. In some instances, it is necessary to use amylaceous and anodyne glysters.

Under the use of these and similar means, if energetically and promptly employed, most cases of gastric fever will terminate favourably between the third and the sixth week. It is necessary, nevertheless, in order to insure their curative operation, to enjoin the rigorous use of low diet, and the employment only of the ptisans, or the mucilaginous and acidulous drinks. Wine is invariably injurious in gastric fever; and it is only after the symptoms have been completely subdued and the patient is convalescent, that this liquor may be exhibited with a very sparing and cautious hand. Whey, or milk diluted with water, oftentimes sits more easily upon the stomach, and quenches thirst more effectually, than other fluids; and it has the advantage of affording as much nutriment as in this state of the system is required.

As the gastro-enteric congestion begins to be relieved, the different secretions become re-established. Bile is discharged in greater abundance, and in a more healthy form; the urine becomes more copious and less hypostatic; and the skin is less dry, and becomes softer. Sometimes, however, it happens that the pulse continues still quick, the urine scanty, and the skin dry. In this state of the system it is sometimes advantageous

to exhibit some of the neutral saline diaphoretic and diuretic medicines, such as the acetate of ammonia or potass, the citrate of ammonia or potass, or small doses of the nitrate of potass with the carbonate of soda.

The carbonate of ammonia is also useful occasionally in dissolving and removing viscid mucus, and, perhaps, in stimulating gently the vessels of the gastro-enteric mucous membrane. With this view it may be given in doses of from one to three grains three times daily, either alone or with rhubarb, or with from two to five grains of musk. The latter combination is sometimes extremely useful in the sinking and debilitated state by which gastric fever is so much distinguished. Of the latter combination, some practitioners are in the habit of giving five grains of the carbonate of ammonia, and ten of musk, every four hours; but in general small doses of these medicines produce more beneficial effects than large ones.

The diet in the convalescent stage should be limited to sago, arrow-root, tapioca, ground rice, and other farinaceous substances.

B. FEVER WITH GENERAL AFFECTION OF ALL THE TISSUES AND ORGANS, AND TENDENCY TO CAPILLARY DISORGANIZATION IN THE MOST VASCULAR.

There is some reason to doubt whether physicians and medical observers in general have attended with sufficient care to the distinctions of the different kinds of continued fever, established by Dr Cullen. He informs us, that he employed the term *Typhus*, without reference either to ancient authority or to modern hypothesis, to denote the whole of that family of fevers which were generally and popularly termed *Nervous*; that he included under this head not only nervous fevers, properly so called, but also those named *Putrid*; or which were attended with symptoms of disorganization; and that he hoped, by the distinctions of *mild* and *more severe*, to be able to comprehend all those various shades of fever which, however they differed to a cursory observer in phenomena, were notwithstanding different in degree only. * He at the same time states,

* "It is by no means convenient," he says, "to distinguish by different names diseases which differ in degree only. But as it has been the recent practice of physicians to apply the name of *Nervous Fever* to a certain species, as if it were different from all others; complying in some degree with this view, I have enumerated under the title of *Milder Typhus*, the fevers mentioned by older ancient writers,

that the most common form of continued fever in this climate seems to be a combination of these two *genera* (Inflammatory and Nervous Fever; *Synocha et Typhus*:) and he, therefore, gave this genus a place in the nosology, under the title of *Synochus*. "At the same time," he adds, "I think that the limits between *Synochus* and *Typhus* will be with difficulty assigned; and I am disposed to believe that the *Synochus* arises from the same cause as the *Typhus*, and is therefore only a variety of it."—(69, p. 76.) To the same effect is his definition of *Synochus*, and accompanying annotation, in which the disease, (*cujus typus hisce regionibus frequens conspicitur*,) is said to consist of inflammatory phenomena at its commencement, and to present those of nervous irritation and capillary disorganization in its course and termination.

It is from this evident that the term *Typhus* was understood by Cullen to apply to the most severe and marked forms of the disease only, or those which authors represent to occur in hospitals, jails, ships, and camps, where numerous bodies of men are assembled within a limited space; while the milder form of *Synochus* corresponded with the disease as it appears in the persons of human beings dwelling separately in cities and towns. He appears, however, to have thought this arrangement insufficient to include all the varieties of continued fever in which nervous symptoms were said to occur, and to have, therefore, been led to subdivide his petechial Typhus into the mild and more severe, to the latter of which he referred those forms of fever which were neither sufficiently inflammatory to be regarded as examples of *Synochus*, nor sufficiently asthenic to be esteemed pure examples of *Typhus*;—in which, in short, the febrile process was more lengthened and less violent, but not, therefore, less dangerous or less fatal.

which may by any means be referred to the Nervous Fevers of the moderns. In this matter, however, since accurate limits can by no means be fixed, I shall not assert that I have been accurate."

"It was still less expedient to follow the opinion either of ancients or moderns in enumerating among the kinds of fevers anything under the name of *Putrid Fever*. In every form of typhus I believe there is a tendency to putrefaction (*putredo*), (capillary disorganization;) but it varies in degree, so that a greater or less degree of this quality varies the species but does not change it. It is sufficient for my purpose to point out under the title of more severe typhus, (*Typhus gravior*,) those fevers which have been particularly called *putrid*, as will be sufficiently obvious from the annexed appellations of various authors." Synopsis. Note under *Typhus*.

This arrangement and its divisions have been severely criticised by various authors and practical physicians.

1. The accuracy with which Dr Cullen applied the term *mild typhus* has been questioned by Dr Willan, who (Reports, 1799, p. 323,) contends, that he should have restricted it to a contagious fever alone, such as he described in Sept. 1799 in London; and that the fevers of Huxham and Gilchrist, which Cullen quoted as examples of this disease, were to be considered as a species of hectic, and not communicated by infection. It is enough that we notice this criticism without entering much into its merits, which perhaps are not so just as its author imagined. At least it has since been admitted by Dr Bateman, that the more violent forms of the epidemic fever as it occurred in London in 1816–17–18, and which he described under the name of severe and complicated *Typhus*, approximated very closely to the slow nervous fever of Dr Huxham, and differed from the pestilential fever, only in the less violence of its symptoms, and its more protracted course. (Bateman's Succinct Account, p. 52.)

2d. Dr Percival censured the contrivance of constituting one *genus* from two assumed *genera*, or making *Synochus* to consist of *Synocha*, itself doubtful, and *Typhus*, which he contended was inaccurately defined; and regarded *Synochus* and the mild and severe forms of *Typhus* as mere varieties of the same species of fever. He also very justly objects to the introduction of *contagious* or *non-contagious origin and communication* as a character in the nosological definition.

3d. Dr Bateman regarded the formation of *Synochus* into a distinct *genus* as quite arbitrary, and asserted, that *Synochus* was in fact *Typhus*, with a degree of inflammatory action in the beginning. But while he charged Cullen with making an artificial distinction, he admitted that his definition of *Typhus* accurately corresponded with the phenomena and character of fever as it appeared in the metropolis between 1816 and 1820.

4th. Most observers of the epidemic between 1816 and 1822 believed that the definitions of Cullen were imperfect, or that his pathological views of the distinctions of fever were erroneous and inconsistent with fact, or that the fever of this country had changed its character since the period when Cullen observed its phenomena and formed his descriptions.

I do not pretend to repel these several objections, or to de-

send the nosological arrangement and distinctions of Cullen, under all circumstances, or in opposition to every argument. But I submit the following observations on the subject in general.

1st. I am inclined to think that Cullen erred rather by making his definitions comprehend too much, than by making them too limited. The greatest error, in my opinion, in the formation of the character of *Typhus*, consists in making it comprehend, not only various fevers of this and similar climates, but the imperfectly understood disease named *Yellow Fever*. In consequence of this principle, he was obliged to furnish a definition which should comprehend, not only the deadly epidemics of camps and hospitals, the virulent attacks of the Black Assizes, and the milder forms of fever which occur in daily practice, but the remittents and sub-continuous fevers of the south of Europe and other warm countries, and the anomalous fevers of the new Continent and the West Indian islands. More extended and accurate observation has shown that this was a mistake; and I think there can be little doubt, that, if the definition had been confined solely to the bad fevers which occur in temperate or cold climates among numerous bodies of human beings, either sporadically or epidemically, this error would have been avoided.

2d. I think there is good reason to believe that Dr Cullen was too desirous in his definitions to give generic characters as decided and as much contrasted as possible, and that this extreme anxiety led him perhaps into some embarrassment with regard to the varieties or sorts of fever. It is evident that he was anxious to give a character of Fever as opposite as possible to that of the inflammatory type (*Synocha*;) and, with this view, he appears to have chosen the most exquisite states of those fevers which occur in jails, hospitals, ships, and camps, as the model from which other varieties might be formed. It is further probable, that, with this view, he had fixed his attention chiefly on those examples of fever, if such there be, in which, after the first onset, there is no distinct or evident stage of inflammatory action; and in which the febrile process appears to consist in a languid and oppressed condition of all the vital powers and actions. That these observations are well-founded, appears from his own language, in which he positively states, that the most common form of fever in this country is the *Synochus*, viz.

that with symptoms of disorder of the circulation at the commencement, and languor of the vital powers towards the conclusion. By this statement he evidently implied that the exquisite form of Typhus was not common in this country, unless under the circumstances above specified, but was frequent in other regions.

3d. Whatever be the result of the observation of Dr Bateman in London, or of other physicians in other parts of the country, I can assert, from personal observation, that the most common form of fever in Edinburgh during the epidemic years, from 1816 to 1820 or 1821, inclusive, was that termed *Synochus* by our nosologist. In the numerous cases of fever admitted either into the Infirmary or into the wards of Queensberry House, the early part of the disease, when it could be observed, was attended with quick, strong, and generally full pulse, great heat and dryness of skin, flushing of the face, much headach, sometimes raving, and more or less suffusion of the eyes. So well marked and general was this action of the sanguiferous organs, that we might with great safety defy the most careful and sagacious observer, to determine at the outset whether the disease was to be fever, or local inflammation, or a cutaneous eruption. These symptoms were succeeded in the unfavourable cases, which alone can be regarded as the pure examples of the disease, by weakness of pulse, a dejected paleness or dirty sallow hue of the countenance, a state of the skin not particularly warm, but unctuous and imperspirable, or alternating with heat and cold, some stupor or raving, and extreme weakness of the voluntary as well as the involuntary muscles.

In point of fact, indeed, the languid or depressed stage, or what has been termed the *Typhoid*, was partly in proportion to the violence of the previous action in the early part of the disease, partly to that of the means used as remedies. These symptoms of violent action were certainly most distinct and conspicuous in the young, the robust, and the vigorous; yet none were exempt from them; and if in any they were trifling or indistinct, this was perhaps rather owing to the difficulty of obtaining correct accounts of the early part of the disease, or the difficulty in some instances of ascertaining when the fever commenced, or perhaps in some instances to careless or imperfect observation. I may add, that not only was this course of

phenomena observed during the epidemic fever, but I have had occasion to confirm it repeatedly since in sporadic cases.

4. I do not, however, conceive, that this destroys entirely the existence of the two varieties of typhous fever, supposed and admitted by Cullen, to prevail in this country in certain circumstances; viz. the mild and severe, or nervous and jail fever. But I am inclined to agree with Drs Bateman, Percival, and others, in regarding them as varieties of the same morbid process as *Synochus*; 1st, Because I am satisfied that the slow nervous fever of Huxham and Gilchrist is attended at its commencement with some degree of increased action, however slight and imperceptible; and 2d, Because I am satisfied that in the more severe form, if the state of increased action is not observed, it is in consequence either of its rapid transition to the state of languor and sinking, or because the affection of some organ as of the stomach in jail fever, described by Pringle, Lind, Smith, and Hunter, prevents it from being noticed.

5. It is of no consequence to determine, whether all these varieties which I admit, proceed from the same contagious or infectious origin; for we can easily conceive two, nay three, different diseases arising from the same cause, or at least under the same circumstances. The true question to be determined, is, whether the various forms of fever present that connection in morbid phenomena and pathological effects which may without violence warrant their being regarded as species of the same *genus*, or varieties of the same species. That this is the case I am disposed to think is sufficiently proved, not only by comparing the observations of different epidemics recorded by various authors; but especially by the light which was thrown on the subject by dissection during the late epidemic, not only of this country, but as it appears, of almost all Europe.

6. I am disposed on this principle to regard the divisions introduced by Dr Armstrong as nearly analogous to those which I now suggest. His simple and inflammatory *Typhus* do not appear to differ but in degree, and they certainly correspond with the character formed of the *Synochus* of Dr Cullen. In both, after the usual imperfect cold, lassitude, and mental and corporeal weakness, a state of action is formed, and continues for some time, and is finally succeeded by the languor, sinking, and debility, which is the effect of the previous capillary disorder. Actual inflammation is an accidental adjunct depend-

ing on individual constitution, peculiarity of season, or other similar causes. His congestive *Typhus* is rather a particular stage than a particular form of the disease. I have seen it in those instances only in which the early stage is very short and rapid, either in consequence of the nature of the febrile action, or in connection with the constitutional peculiarity of the individual.

I have made these observations as introductory to the semeiology of fever; but without any wish to bias the mind of the reader by hypothetical speculations. That I may avoid this as much as possible, I deliver the description of three varieties of continued primary fever; and while I make a general reference to the descriptions of Huxham, Pringle, Lind, Gilchrist, C. Smith, Armstrong, Bateman, and Percival, I shall not scruple to methodize, rectify, and arrange the phenomena according to the result of my own observation.

a.—SLOW NERVOUS FEVER, *Typhus mitior*, Sp. i. var. 1.

Febris maligna, hectica, convulsiva, sive lues νευρωδης, Willis, *de morb. convulsiv.* cap. 8. *Febris pestilens*, Fracastor. *de morb. contag.* L. II. cap. 4. *Febris pestilens sine caractere veneni*, Forest. L. VI. obs. 26. *Febris hectica pestilens*, Forest. L. VI. obs. 32. *Febris nova ann.* 1685, Sydenham, *Sched. monitor.* *Febris putrida nervosa*, Wintringh. *Com. Nosolog. ad.* ann. 1720, 1721. *Febris lenta nervosa*, Huxham on Fevers, chap. 8. *Febris contagiosa*, Lind on Fevers and Infection, *passim.* *Typhus nervosus*, Sauv. sp. 2. *Typhus comatosus*, Sauv. sp. 3. *Tritæophya typhodes*, Mangeti, Sauv. sp. 11, Raym Fort.

b.—THE PUTRID, PESTILENTIAL, SPOTTED, OR MALIGNANT FEVER, *Typhus gravior*, Sp. i. var. 2; *Tabardillo* of the Spaniards.

Febris pestilens, P. Sal. *Divers. de febre pestilenti.* *Febris pestilens maligna*, Sennert. *de febribus*, I. iv. cap. 10. *Febris maligna pestilens*, River. l. xvii. sect. iii. cap. i. *Febris pestilens maligna*, ann. 1643. Willis, *de febribus*, cap. 15. *Typhus carcerum*, Sauv. sp. 1; *Febris nautica pestilentialis*, Huxham *de aëre ad* ann. 1740; *Miliaris nautica*, Sauv. sp. g. *Febris putrida contagiosa in carceribus genita*, Huxham *de aëre ad* ann.

1742; *Miliaris purpurata*, Sauv. sp. h.; *Febris carcerum et nosocomiorum*. Jail or Hospital Fever. Pringle, Diseases of the Army, p. 294; Van Swieten, *Maladies des Armées*, p. 136. *Typhus castrensis*, Sauv. sp. 5. *Febris petechialis*, Spotted Fever. Huxham on Fevers, chap. 8; Ludwig. *Inst. med. clin.* No. 146; Schreiber von *erkenntniss, und cur der Krankheiten*, p. 126; Monro, Diseases of Military Hospitals, p. 1. *Febris catarrhalis maligna petechizans*, Juncker, 72; Hoffm. II. 75; Eller *de cogn. et cur. morb.* sect. vi.; Rogers, Essays on Epidemic Diseases, 1708, 1718; O'Connel, *Obs. de morbis*, ann. 1719, *et seq.*; *Febris atacta*, Selle; Fievers dites Putrides ou Adynamiques; Fievre Adynamique; Fievers dites Malignes ou ataxiques; Fievre ataxique, Pinel.

c.—COMMON OR MIXED CONTINUED FEVER, *Synochus*.

On the Nervous Fever, by Richard Manningham. Lond. 1760.—An Essay on Fevers. 6th edit. By John Huxham, M. D. Lond. 1769.—An Essay on Nervous Fevers in a Letter to Dr John Stevenson, Ed. by Dr Ebenezer Gilchrist. Dumfries.—Edin. Med. Essays, Vol. iv. p. 278, Art. 23. Edin. 3d. edit. 1747, 1735.—Observations on the Nature and Cure of Fevers, by William Grant, M. D. 2d edit. 8vo, Vol. i. p. 332.—Observations on Fevers, especially those of the Continued Type, &c. by John Clark, M. D. Newcastle. Lond. 1780.—Economical and Medical Observations on Military Hospitals, and on Camp Diseases. 8vo. By Richard Brocklesby. Lond. 1764.—Heysham's Account of Jail Fever, or *Typhus Carcerum*. 1782.—Campbell on Typhus, 1785. Essay on the Contagious Fevers, by John Alderson. Hull, 1788.—Observations on the Disease called Jail or Hospital Fever, by John Hunter, M. D. Medical Transactions, Vol. iii. Lond. 1785, p. 345. Read May 1785.—Observations on the Jail, Hospital, or Ship Fever, by Robert Robertson, M. D. Lond. 1783. 8vo.—A Description of the Jail Distemper as it appeared among the Spanish Prisoners at Winchester in 1780, &c. by James Carmichael Smith, M. D. &c. Lond. 1795.—Reports on the Diseases of London, by Robert Willan, M. D. Lond. 1800.—A Letter to Dr Percival on the Prevention of Infectious Fevers, by John Haygarth, M. D. &c. Bath, 1801.—A Collection of Papers, &c. by John Clark, M. D. Newcastle, 1802.—On the Necessity and Means of Suppressing Contagious Fever in the Metropolis, by C. Stanger, M. D. &c. Lond. 1802.—An Outline of the History and Cure of Fever, Endemic and Contagious; more expressly the Contagious Fevers of Ships, Jails, and Hospitals, &c. &c. by Robert Jackson, M. D. 2d. edit. Edin. Lond. 1808, cap. i. iv. and v.—Account of the Diseases of the Sick landed at Plymouth from Corunna in 1809, by Richard Hooper, M. R. C. S., &c.—Edin. Med. and Surg. Journal v. p. 398.—A Treatise on the Principal Diseases of Dublin, by Martin Tuomy, M. D. &c. Dub. 1810.—Observations on Typhus or Contagious Fever, in an Essay on Yellow Fever. Part v. chap. i. by E. N. Bancroft, M. D. Pp. 497. Lond. 1811.—Remarks on the Pathology and Treatment of Typhous Fever, by Albert Henry Callanan, M. D. 8vo. Cork, 1817.—A Practical Illustration of Typhous Fever, of the Common Continued Fever, and of Inflammatory Diseases, by John Armstrong, M. D. &c. 3d edit. 8vo. Lond. 1819, p. 566.—History and Description of an Epidemic Fever, commonly called Spotted Fever, which prevailed at Gardiner's Mains, 1814, by E. Hale, M. D. &c. 8vo. Boston, 1818.—Medical

Report of the Hardwicke Fever Hospital, for the year ending on the 31st March 1818. Dublin Hospital Reports, Vol. xi. by John Cheyne, M. D. 8vo. Dub. 1818. Pp. 144.—Medical Report of the Fever Hospital and House of Recovery, Cork Street, for the year 1816, with Observations on the succeeding Epidemic, and the Treatment adopted for its Cure, by William Stoker, M. D. &c. 8vo. Dub. 1818. Pp. 71 and 15.—Medical Report of the Fever Hospital and House of Recovery, Cork Street, Dublin, for the year ending 4th January 1819, by Richard Grattan, M. D. 8vo. Dub. 1819. Pp. 123.—Medical Report of the Fever Department in Steeven's Hospital, containing a Brief Account of the late Epidemic in Dublin, from September 1817 to August 1819, by John Crampton, M. D. &c. 8vo. Dub. 1819. Pp. 63.—Observations on the Condition of the Middle and Lower Classes in the North of Ireland, as it tends to promote the Diffusion of Contagious Fever, by Francis Rogan, M. D. Lond. 1819.—Practical Observations on the Treatment, Pathology, and Prevention of Typhous Fever, by Edward Percival, M. B. &c. 8vo. Lond. 1819. Pp. 156.—A Succinct Account of the Contagious Fever of this Country, exemplified in the Epidemic now prevailing in London, with the Appropriate Method of Treatment as practised in the House of Recovery, &c. by Thomas Bateman, M. D. &c. 8vo. Lond. 1818. Pp. 177.—A Practical Treatise on the Efficacy of Blood-letting in the Epidemic Fever of Edinburgh, by Benjamin Welsh, M. D. 8vo. Edin. 1819. Pp. 208 and 126.—A History of the Epidemic Fever which prevailed in Bristol during the years 1817, 1818, 1819, Founded on Reports of St Peter's Hospital and the Bristol Infirmary, by J. C. Prichard, M. D. 8vo. Lond. 1820.—An Historical Sketch of the Causes, Progress, Extent, and Mortality of the Contagious Fever Epidemic in Ireland, during the years 1817, 1818, and 1819, by William Harty, M. B. &c. 8vo. Dub. 1820. Pp. 220 and 282.—A History of the Epidemic Fever which prevailed in Bridlington and the neighbourhood in the years 1818 and 1819, by Humphry Sandwith, Surgeon, Bridlington. 8vo. Lond. 1821. Pp. 172 and 144.—Observations on the Prevention and Treatment of the Epidemic Fever at present prevailing in the Metropolis and most parts of the United Kingdom, by Henry Clutterbuck, M. D. 8vo. Lond. 1819. Pp. 299.—An Account of the Rise, Progress, and Decline of the Fever lately Epidemic in Ireland; together with Communications from Physicians in the Provinces, and various Official Documents, by F. Barker, M. D. &c. and by J. Cheyne, M. D. &c. 2 vols. 8vo. Dub. 1821. Pp. 500 and 387.—Reports of the Practice in the Clinical Wards of the Royal Infirmary, Edinburgh, in 1817 and 1818, by Andrew Duncan, Jun. M. D. &c. Edin. 1818.

§. I. SEMEIOGRAPHY.—From the descriptions of Huxham, Gilchrist, Pringle, and Grant, it was believed to be established, that the fever to which Sauvages, and afterwards Cullen, gave the name of Typhus occurs in two forms,—that of the mild and severe.

a. The first variety makes its approach by listlessness, slight chills, and sense of shivering, alternating with flushes of heat, and a sense of general uneasiness and fatigue, with dejection of mind, and more or less of a sense of weight or pain in the head, and giddiness, squeamishness, loathing and some sickness, with a sense of weight and oppression at the epigastric region. As the disease advances, the patient feels the head still more

heavy, sometimes with pain along the course of the coronal suture, or between the temples, or in the occipital region; and giddiness, with an overpowering sense of pain and fatigue in the lumbar region, renders him unable to maintain the erect position. At the same time the pulse is a little quicker than natural, from 80 to 90 in the minute, small, creeping, or fluttering and oppressed; the respiration is about five or six beats more rapid than natural, and inspiration is less full than in the state of health,—in consequence of an undefined and uneasy sense of weight and oppression beneath the sternum, and round the lower part of the chest, while there is a sense of painful tension and fullness at the epigastric region. The tongue is covered with a thin whitish fur, and is tremulous when protruded. The patient is generally a little thirsty but sometimes does not complain much of it.

In this state the patient may continue for from five to six days with a dull heavy eye and sunk countenance, restless and sleepless, yet with the appearance of dozing at intervals; and during this time, while the cheeks exhibit an occasional transient flush, and partial sweats break out upon the head and neck, the extremities may be cold and dry. The breathing continues to become more anxious and shorter, and the sense of weight and tension at the epigastric region to be more oppressive. The bowels are slow, and with difficulty moved by medicine. The urine is generally pale, limpid, and void of sediment, or it is opaque and muddy like vapid beer.

About the seventh or eighth day, the pain and weight of the head and the giddiness become much more distressing, and the patient complains that he hears bells ringing (*tinnitus aurium*,) or that there is a constant beating noise within the head. At the same time he is either restless during the night, or mutters incoherently, and, forgetting where he is, starts up suddenly in great confusion, and soon after relapses into the state of drowsiness and muttering. This condition is denominated *typhomania*.

At this period, if the patient attempts the erect position, his extreme weakness is indicated by becoming suddenly pale, and even swooning away. The diminution of his sensibility also is indicated by his ceasing to complain of thirst, and the sense of weight at the epigastric region, which, however, continues as tense as before. As the disease proceeds, the fur upon the tongue becomes dry upon the middle, glazed, and brown or

orange-coloured, with a moist margin on each side; the *typhomaniacal delirium* partakes more completely of stupor, and at length terminates in *coma*; the patient becomes unable to swallow, and is in danger of being choked when drinks are given him. All the muscular motions are extremely feeble and unsteady, and the tendons at the wrist are in a state of incessant vibratory starting (*subsultus tendinum*,) with occasional convulsive twitches of the face. Mucous rattling takes place in the windpipe and bronchial tubes, the nails become livid, and the extremities cold, and the patient may die in a state partaking of *coma* and *asphyxia*, some time between the fourteenth and twenty first days.

In more favourable cases, after the patient has continued in a state of restlessness and anxiety during the day, and sleeplessness and typhomaniacal muttering during the night, he begins about the eighth, or tenth, or thirteenth day to sleep more soundly; the skin of the extremities becomes warmer, the pulse less oppressed and fuller, the respiration less anxious and rapid, and the bowels to be more easily moved by medicines, or even to be affected by spontaneous diarrhœa. These changes denote the approach of a favourable termination; and on the following day, the tongue is found to be moist, the skin to be softer, more perspirable, the urine to become more copious, and the patient to evince marks of returning consciousness of his condition. He continues, however, very drowsy, and sleeps incessantly, and is generally more or less deaf.

The description now given embraces the most usual and constant characters of slow nervous fever, but the symptoms are liable to considerable variety both in degree, in conjunction, and in duration. The most important point for the physician is to distinguish favourable from unfavourable symptoms.

Among the class of favourable symptoms may be enumerated the patient's continuing sensible to thirst, and drinking copiously, his continuing to swallow with ease, the circumstance of delirium or confusion of thought being chiefly observed during night and abating during the day, the respiration continuing to be under 30 in the minute, and without *tracheo-bronchial* rattling, the pulse passing from the small, oppressed, and contracted state to that of openness, freedom, and fulness, the urine, whether copious or scanty, continuing to be voided, the bowels continuing to be acted upon by medicine, and the extremities continuing warm.

Among the class of unfavourable symptoms are to be ranked

a dry brown fur upon the tongue, with little or no complaint of thirst, inability to swallow, and aversion to be disturbed, general *anaesthesia*, indicated by the patient making no complaint, constant *delirium* or *typhomania* both day and night, especially if succeeded by coma, coma itself, *subsultus tendinum* or convulsions, the respiration tending towards 40 in the minute, or becoming unusually slow and languid, tracheal or tracheo-bronchial rattling, the pulse becoming very quick, small, feeble and irregular, hiccup, suppression or a very scanty secretion of the urine, and coldness of the extremities.

b. Of the disease now described, that denominated Putrid, Pestilential, Jail or Hospital fever, is conceived merely to be a more exquisite form, in so far as to the symptoms already enumerated are superadded those which indicate what the older pathologists denominated putrescence, but what I regard as proofs of disorganization of the system of the capillary vessels.

Thus the identity of the two diseases, and the greater intensity of the one above the other, are proved by the greater intensity of the pain of the head between the temples, in the forehead, or in the orbits; by the suffusion and injection of the eyes; by the throbbing of the temporal arteries and carotids; the tingling of the ears; the dark orange yellow viscid fur upon the tongue; the oppressive weight and pain at the pit of the stomach, and hiccup; the panting, shortness, and sobbing of the respiration; the early appearance and unremitting continuance of *delirium*; and the pain and sense of weakness in the loins and all over the limbs. The skin also betrays a degree of pungent heat (*calor mordax*,) which leaves on the finger a disagreeable sensation for some minutes. The countenance is dull, heavy, and inanimate, the complexion dingy, livid, and bloated, while the eye has a heavy peculiar stare, as if the individual were under the influence of liquor. The tongue, lips, and teeth become early covered with black viscid mucus (*sordes*.) *Delirium* partakes more, and at an earlier period, of the comatose character; and the urine is liable, at an earlier period, to cease to be secreted, or to be retained in the bladder, from loss of power and from compression of the brain and spinal chord.

The symptoms which indicate disorganization of the capillaries are the following.

First, generally on the fourth or fifth day of the disease,

or some time between that and the eleventh, minute red spots (*stigmata*) appear on various parts of the breast, back, and sides, and gradually enlarge until they attain the size of small tares. In this shape they are denominated *petechiæ*. At their first appearance they are generally red; but after the lapse of the second or third day they generally acquire a violet, purple, or livid tint, which is then regarded as an unfavourable symptom. These petechial spots are the effect of congestion of the capillaries of the skin, and they consist in general of blood effused by exhalation from the capillaries of the outer surface of the corion. In very bad cases they appear early, become as large as split peas, and acquire a vivid purple tint. In a very marked case of this kind, which I witnessed in the year 1819, they were accompanied with a bright red glazed colour of the tongue, much heat of the skin, typhomaniacal delirium, and a throbbing tense pulse. In some instances, they appear even in the mucous surfaces, especially on the lips, tongue, inner membrane of the cheeks, and in the throat; and in the instance to which I have already referred, similar spots were found after death in the intestinal mucous membrane.

In favourable cases, when they begin to disappear, their colour becomes less vivid towards the margin, and then assumes a brown or greenish tint; afterwards becomes yellow, and eventually fades away.

Secondly, it is not uncommon for spots or stripes of a dark-red, or even purple colour, and without determinate shape, to appear upon various parts of the body during the progress of malignant fever. These spots, from their resemblance to the stripes produced by the blow of a rod or whip, are variously denominated *molopes*, *vibices*, or *ecchymomata*. They appear indiscriminately upon the anterior and posterior parts of the body; but are generally most frequent either upon parts exposed to pressure, or where the circulation in the vessels of the skin is inert and languid. Thus the skin covering the *scapulæ*, that of the loins and hips, the ears, the tip of the nose, one or more fingers, or one or more toes, are the usual situations for *vibices* or stripes. It sometimes happens even that a large part of the trunk, such as the back, or more or less of an extremity, as the fore-arm, from the tip of the fingers up to the elbow, or the leg, from the toes to the knee, becomes marbled or chequered,—first of a dark red, then violet coloured, and finally blue and black.

These stripes are like petechial spots, effects and indications, first of an overloaded state of the capillary vessels of the skin, then of the slow motion of the blood in these vessels, of its stagnation, and eventually of its decomposition and extravasation.

In the *third* place, it is not uncommon for the skin over the *sacrum* to become reddened from pressure, and the irritation of the discharges, especially of the urine; and this red colour rapidly gives place to a purple or livid tint, which finally becomes black, indicating mortification of the part, which is then, if the patient possess sufficient strength, separated by a tedious process of suppuration, ulceration, and granulation.

In the *fourth* place, in some instances, either with or without *petechiæ* and *vibices*, hemorrhage takes place to a greater or less extent, from one or more of the mucous surfaces. Thus blood may be discharged from the nostrils, from the mouth and throat, from the bronchial membrane, from the stomach, from the intestinal tube by stool, and even from the kidneys, in the form of bloody urine. The blood thus discharged is seldom either copious or pure, and it is generally in the form of dark-coloured fluid, mixed with more or less serum and mucus. It escapes also not by breach of the membrane, but by a species of exhalation from the capillaries of the mucous surfaces.

In the *fifth* place, the phenomena now enumerated are to be regarded as instances of capillary disorganization, taking place in consequence of the excessive congestion of the vessels of the skin and mucous surfaces. In addition to these symptoms, however, some typhous epidemics have afforded examples of more intense disorganization in the internal organs. Thus in the hospital fever observed by Sir John Pringle, in three of ten cases inspected after death, portions of the brain or cerebellum were found converted into purulent matter, and in an epidemic described by Jemina at Turin, portions of the brain and cerebellum were also found in a state of softening and suppuration. These appearances, however, are neither constant nor essential; and they are insufficient to justify the inference drawn by Marteau de Grandvilliers, and afterward by Speyer, Marcus, and Clutterbuck, that jail fever either consists in, or gives rise to, inflammation of the brain.

In some instances a miliary eruption appears over various parts of the body, but these are not critical, and they are so

far from producing any alleviation of the symptoms, that they often add materially to the sufferings of the patient.

The foregoing description will communicate some idea of the disease denominated Hospital, Jail, Putrid, or Spotted Fever. In the exquisite form thus described, it is a less frequent disease than it formerly was, and we rarely meet with it in the well-marked and malignant character described by Huxham, Pringle, and Lind. These changes are partly to be attributed to the instructions of Lind and the exertions of Howard, who effected a great and remarkable revolution not only in the economy of ships, prisons and workhouses, the ordinary hot-beds of this form of fever, but indirectly in the habits of the lower ranks of society, who were both its most usual producers, and its most frequent victims. Greater attention to ventilation and cleanliness, with, perhaps, less frequent vicissitudes in the quantity and quality of food and drink, have tended to diminish the prevalence of the malignant form of the disease, and to modify somewhat its character. In order to communicate some idea of this modification, and also to illustrate the character of those circumstances under which Typhous fever takes place, I shall add a few remarks upon the history of this disease since the time of Huxham, Pringle, and Lind.

In the year 1780, the jail fever broke out among the Spanish prisoners, confined at King's House in Winchester. We learn from Dr Carmichael Smith, who observed this disease, that it was distinguished by a painful sense of sinking and anxiety at the pit of the stomach, little affection of the nervous system, and, by the rarity of petechial spots, buboes, or hemorrhages. Raving was not frequent or uniform; and coma seldom appeared unless immediately before death. The eyes, however, were dull and injected, and the sick appeared always drowsy or slumbering. (Pp. 28-32.)

In Dr Robertson's account of the ship fever in the *Juno* 1777, and *Rainbow*, it is doubtful whether this disease were of the continued nature or not, for it is described as consisting of remissions. Dr John Hunter met with this form of fever in February 1779 in London; he remarked it during the subsequent years of 1780, and again in the winters of 1783-84, and 1784-85, (*Med. Trans.* Vol. iii. p. 345-349;) and he infers that it is more prevalent in the cold moist weather of winter, when ventilation is imperfect in the abodes of the poor, than in

the warm dry weather of summer, when it is practicable to open windows, and when the inhabitants are more in the open air.

Pinel informs us, that he has seen the fever described by Pringle frequently in the infirmaries of the Bicetre of Paris, in those of the Salpetriere in 1793, and among the prisoners of war at Semur and Autun in 1806. All of these he regards as complications of the continued Ataxic Fever, and refers them to the head of Adynamic Ataxic Fever. (Pp. 230-232.) Dr Jackson describes this fever as it occurred in the British troops in 1793-94, in the Low Countries, where it appears to have been distinguished by symptoms of cardiac action, in the early stage of the disease; and at Cork, the Cove, and Spike Island in 1795-96, where some examples of the most active and intense forms of febrile action occurred. "Some were instantly knocked down, as it were, by a blow on the head, appearing as if in deep intoxication or apoplexy, speedily arresting or suffocating the powers of life." (Pp. 40.)

The wars which upon the continent of Europe succeeded the French Revolution, were attended, more or less uniformly, with febrile epidemics. During the first ten years, Typhus appeared in various parts of Germany and Italy, in which, according to the testimony of Omodei and others, it has been very frequent, and invariably accompanied with petechial eruptions. Afterwards it prevailed in other European countries very nearly as the seat of warlike operations was changed. In 1805, it appeared in Austria after the battle of Austerlitz, and was described by Larrey. In 1806, 1807, it broke out violently and mortally in Prussia and Poland, and, among other authors, was described by Hufeland. Its phenomena were from the commencement, great weakness of the muscles, voluntary and involuntary, stupor, trembling or unsteadiness of the muscular motions, speedy disorder of the mental faculties, coma, rapid sinking of the pulse, pungent heat of skin, though sometimes it was not warmer than natural, starting of the tendons, spasms in most of the muscles, with colliquative looseness or spontaneous purging.

The war between France and Austria in 1809 was attended with a similar epidemic, described by J. V. Hildenbrand. According to the observation of this learned observer, fever (*Typhus*) is of two kinds, regular and irregular. Regular *Typhus* is that form in which there is an inflammatory stage

for a larger or shorter time, rarely less than seven days, with headach, painful tension, or locking of the pit of the stomach, sickness, or even vomiting, irregular heat and cold, and painful bruising of the back and limbs. About the end of the seventh day, an aggravation or exacerbation of the symptoms is succeeded by apparent relief for some hours,—which is succeeded by loss or disturbance of the mental powers (*typhomania*,) cold dryness of the skin, petechial spots, foul coating of the tongue, oppressed breathing, difficulty of swallowing, hiccup, and other signs of the state of depression. In irregular *Typhus*, the phenomena of the disease appear and proceed without distinct order. 1. Sometimes the raving becomes phrenitic, stupor is changed into coma, or pleurisy or spitting of blood may appear. 2. In other instances, constant squeamishness and repeated vomiting, or intestinal pains, with frequent fetid fluid stools, are its attendants. 3. In other cases, again, the phenomena of the second stage appear from the first attack; and the patients have cold, dry, unctuous skin, *typhomania*, spasmodic motions of the muscles (*subsultus*, *singultus*, *convulsio*, &c.) from the first. In such circumstances, death either takes place at the first; or the mortal symptoms, *petechiæ*, *vibices*, hemorrhagies, &c. indicate that it is very near. 4. Symptoms of inflammation either appear along with the nervous symptoms, or continue beyond the seventh day, notwithstanding the nervous affections. 5. In other cases, the black coating of the tongue, the nervous symptoms, and the petechial spots, &c. may appear later than the seventh day.

Fever appeared once more in 1812–13 in the French and Prussian army, after the horrors of the expedition to Moscow. In December 1812 and January 1813, the remains of the French reappeared after their retreat from the conflagration of the Russian city, on the frontiers of Prussia, in Lithuania and Silesia. These miserable beings sunk down with general trembling, total loss of power, failure of the mind and nervous system, death of the skin, with fever, petechial spots, and colliquative purging. The disease was soon introduced by these troops into Torgau, Custrin, Berlin, Königsberg, and Breslau; spread over the whole of Saxony, westward to Hanau, and the banks of the Rhine southward to Wirtemberg, and other places, and was finally conveyed to Paris.

This is the disease to which the German physicians have ap-

plied the name of war-fever, or war-plague (*Pestis Bellica*, *Kriegspest*.)—Hufeland, Hildenbrand, Marcus, &c.

c. The subject of fever, especially contagious fever, has, during the eight years between 1816 and 1824, claimed the particular attention of the British physicians. It may be asserted, that it was never totally obliterated in some part or other of the country, and more especially in large towns, where many human beings are assembled for the purposes of trade, manufactures, or other convenience. Sporadic cases were never wanting. We thus find it frequently mentioned in the Reports of Willan and Bateman, in the work of Hamilton of Edinburgh, in the writings of Clutterbuck, Armstrong, Stoker, Mills, and perhaps some others. The cases which those physicians have occasion to treat and observe, were such as daily practice presents, without epidemic character or general prevalence. In the year 1816, however, it assumed a different character. We learn from Dr Harty, that it was observed to prevail in an unusual extent and degree in *Munster*, at Cork in August, at Cove and Tipperary in September, at Mallow and Cashell in October, and at Nenagh in November; in *Connaught*, at Galway in Autumn, and at Killala in September; in *Ulster*, at Enniskillen in July, at Newry in August, at Downpatrick in October, and at Monaghan and Armagh in December; in *Leinster*, at New Ross, Carnew, and Edenderry in August, at Carlow in September, and at Passage in October. In most of these places it subsided during the winter months; but became more unequivocally epidemical in the course of the ensuing year, 1817, during the first four months of which it spread very extensively in the provinces of *Ulster*, *Munster*, and *Connaught*; and in the course of the autumn proceeded into *Leinster*, and took possession of *Dublin* in September. After this period it prevailed most generally in *Ulster*, in the autumn and winter of 1817; and in the other three provinces in the summer and autumn of 1818.

From Ireland it is generally believed to have been conveyed by incessant migrations of its inferior inhabitants into the adjoining towns of England and Scotland. It was found in this manner in Bristol, Liverpool, and Bridlington in 1817; in London in 1816 and 1817; in Glasgow and Edinburgh in 1816; and in other less considerable places about the same time, or shortly after. It appears to be the general result of the observations

of Percival, Bateman, Graham, Welsh, Christison, and others, who attended to the origin and progress of this disease, that it was in almost all these places capable of being traced originally to those parts which were the haunts of the fresh arrivals of strangers from Ireland, generally in a state of extreme poverty and helplessness. It is not, however, my intention to inquire here into the particular causes of this fever. I adduce these general facts to show its uniform prevalence, and the connection which subsisted between the epidemic in the most remote parts of the country.

In all these situations, the general character of the fever was much the same. With few exceptions, it commenced with shivering and languor, followed by quick pulse, heat, headach, pain of eyes and orbits, pain of limbs, back, and generally a sense of load or uneasy weight at the pit of the stomach. The most uniform symptoms in the early part of the disease were headach, throbbing or beating within the head, ringing of the ears, flushed face, general heat, and the uneasy sensation of oppression at the pit of the stomach. It is remarkable that the Irish uniformly described this sensation as a "pain of the heart." If the disease went on, these symptoms were followed by stupor, or *typhomania*, starting of the tendons, and general convulsive motions, while the pulse became quicker, weaker, and more irregular, so that in some instances it was a mere fluttering at the wrist, and the general heat diminished, but without giving rise to moisture of the skin. Petechial eruptions were not very common, unless in old, languid subjects, or those whose constitutions were impaired by habits of intoxication and other irregularities. In a few very bad cases, the skin of the trunk and legs was marbled for two or three days before the fatal event. Hemorrhage of the mucous membrane occurred in a few cases, and in some the tract of the intestinal canal was found spotted after death. I must not here enter into the consideration of the different peculiarities of the fever in different parts of the country; and I trust that the copious list of references will enable my readers to procure this information from several of the most authentic sources. Those of Drs Armstrong, Mills, Bateman, and Percival, may be particularly recommended.

I have already described, as nearly as possible, the general characters or phenomena of fever. I have now to advert shortly

to varieties in its phenomena, according as one organ is more particularly affected than another.

1. In almost all forms of fever, the symptoms indicate more or less derangement in the circulation of the brain. Raving, which is a very usual symptom, was believed by Cullen to depend on irregularity in this circulation; but I have already shown that this state consists in accumulation and retarded motion of the blood in the arterial division of the capillary system, and consequent emptiness and flaccidity of the venous division. Intolerance of light, ringing of the ears, throbbing within the head, much pain of the head, either occasional or constant, loss of memory, phantasms or images presented to the patient when no objects are present, every degree of raving or incoherent speech, stupor, *coma*, and *typhomania*, may all justly be said to indicate this morbid condition of the brain or its circulation, or both, which I have elsewhere attempted to explain more fully.—(Clinical Report, Med. and Surg. Journal, xli.) If these symptoms predominate, they constitute what some have termed *Cephalic* or *Cerebral Fever*.

2. In most forms of fevers, I have already noticed, the stomach and intestinal canal are disordered. Squeamishness, sickness, thirst, occasional or incessant vomiting, loss of appetite, mucous covering of the tongue, may be conceived to indicate disorder of the former of these parts of the alimentary canal; while acute or dull pains of the belly, griping, unusual looseness, with mucous, bloody, or dark-coloured stools, or extreme constipation and insensibility of the intestine to purgative medicines, are the symptoms which denote the disorder of the second. This form of fever has been termed *Gastric* and *Enteric*, *Intestinal* or *Abdominal Typhous Fever*.

3. During the winter season, and the colder months of the year, it is not uncommon to remark cough, pain of breast, and difficult, or catching, or rapid breathing, in some cases of fever. In some instances, thickened mucus is spit up, sometimes tinged with blood; or pure blood is coughed up, while all the symptoms of fever continue. This constitutes *Catarrhal Fever*, *Pulmonic Fever*, and *Typhoid Pneumonia* of Cappel and practical authors.

All these varieties are conceived to depend on the extreme affection of one organ; and I shall have occasion to show, that though the same remedies exercise control over all, yet they occasionally afford grounds for some change in practical manage-

ment. Other instances of this change or variety of local action have been enumerated; but it is quite unnecessary here to dwell on these further.

§. II.—MORBID ANATOMY.—The appearances on dissection vary according to the violence of the symptoms and the duration of the disease. According to Percival, in cases attended with muttering, delirium, and coma, the brain usually exhibited evidence of arterial and venous congestion. The vessels of the soft membrane and choroid web were unusually numerous, and unusually distended, generally with dark-coloured blood; and in these, serous fluid interposed between this and the arachnoid membrane, gave the latter the appearance of jelly. Limpid fluid was not unfrequently found in the cerebral cavities.

I examined numerous cases of this disease during the epidemic of Edinburgh, both in the Royal Infirmary and the Fever Hospital of Queensberry House. In general, I recognized the appearances now enumerated, and especially remarked the following. Where the upper division of the skull was removed, the cerebral membranes were occupied with large blood-vessels, filled with dark-coloured blood generally coagulated. These vessels were largest and most numerous on each side of the longitudinal sinus, and especially towards its posterior end. Upon examination they proved to be chiefly veins; but it was remarkable that the divisions of the internal carotid, and basilar artery at the basis of the brain, were equally distended with dark-coloured coagulated blood. When the hard membrane (*dura mater*) was cut through and detached, in general a gush of limpid fluid mixed with blood issued from the upper end of the spinal chord. When this was attentively examined, it was found that the limpid fluid escaped from the membranes of the spinal chord chiefly, while the blood was from veins and arteries, divided in cutting across the upper end of the chord. Limpid fluid was lodged between the soft membrane (*pia mater*) and arachnoid, in the intermediate delicate filamentous tissue; and this fluid was always most abundant in the vicinity of large venous trunks. The consistence of the brain varied; but it was generally firm, when examined within fifteen or eighteen hours after death. Its substance was almost uniformly traversed by numerous red vessels, which were larger than in the state of health. When the organ was cut into slices, each slice presented numerous red points, arising from

the division of these vessels. The choroid plexus was always more than usually crowded with distended vessels; and sometimes large canals, filled with dark-coloured blood, could be traced passing into the gray-white substance of the optic eminences (*thalami optici*.) A quantity of fluid, which was limpid or turbid as the *plexus* was detached carefully or not, was generally found in the cavities named *ventricles*; but in some instances, even in which death had been preceded by coma, this was not found. In one or two cases, on the other hand, in which the coma had never been deep or lasting, but rather a degree of stupor throughout, a considerable quantity of fluid was found in the cavities, and in addition, the partition (*septum lucidum*) was attenuated, perforated, or broken down.* The cerebellum was also much redder than natural, and its soft membrane greatly more vascular, especially where it penetrates between the plates. I have already stated that watery fluid generally escaped from the spinal column at the moment of incision. When this cavity was opened first, fluid was found in general between the lining of the *vertebræ* and the soft membrane, but much more abundantly between the soft membrane and the denticulate ligament. The vessels of the membrane were large, especially at the lumbar region, tortuous, much distended with black blood, and more numerous than in the state of health.

The lungs were generally very dark-coloured, much gorged with black blood, and clots of this were found in the large vessels. Percival informs us that he found in most cases sanguineous congestion of one or more entire lobes, with mucous and purulent engorgement of the bronchial tubes, a florid hue of the pleura of one or both cavities, with serous effusion, *coagula*, and membranous adhesions. Sometimes the lungs are found "studded with abscesses or tubercles in various stages of advancement to suppuration." (85.) I found in a few cases numerous minute abscesses diffused through the lungs, but without being preceded by tubercles; at least tubercles could not be detected at any stage in the same lung. These abscesses were generally about the size of a pea, and were not surrounded by indurated lung or other morbid changes. The heart presented nothing peculiar, unless in being almost uniformly

* See my account of the dissection of Burns, and one or two other cases in the Clinical Reports of Dr Duncan.

distended with clots of black blood,—in one or two instances mixed with air.

The peritoneum was generally found in a healthy state; in one or two instances fluid was found in its cavity; in others it presented occasional patches of vascular redness, arborescent, or asteroid. In two or three cases in which the symptoms had been obscure, or not well-marked, the peritoneal covering of the stomach had lost its brilliancy, was covered with a thin layer of lymph, and slightly vascular. In a few the mucous membrane of the stomach was thickened, or abraded, unusually red, or otherwise diseased. The peritoneal intestinal membrane was often destitute of its brilliancy, traversed sometimes with red vessels, either in arborescent or asteroid form. Rarely coagulable lymph was found covering it. The intestinal mucous membrane was much more commonly affected. Sometimes it was thickened, sometimes much softened and abraded; in other instances it was swelled and reddened (phlogosed,) and in not a few it presented numerous petechial or red spots over a considerable tract. These petechial spots occurred in the intestinal mucous membrane, with or without spots of the skin; but they were generally most distinct, largest, and most numerous where the skin was spotted. In such cases, looseness, with bloody stools, was common for some days previous to death. This state of the intestinal mucous membrane was chiefly seen in old worn-out subjects. Similar morbid changes were recognized by Dr Percival. (86.)

These facts, ascertained by dissection, show principally the effects of the morbid process of fever,—and if judiciously connected with attentive consideration of the phenomena, may be useful in communicating some idea of the nature of the febrile process itself. I am not aware that they will throw much light on what has been termed its proximate cause,—an inquiry which, perhaps, is not productive of so much benefit as has been imagined. It is requisite for the practitioner to know the course and natural tendency of the disease, to be aware of the injuries which may be inflicted on the vital organs, and to know the circumstances which favour or counteract these injuries. Disclaiming, therefore, the notion of attempting to consider the nature of the *proximate cause*, in the sense in which it was used by the elder pathologists, I confine my present remarks to the inferences which may be justly derived from facts

discovered by observation of phenomena either in the living body under the process of fever, or in the dead body after that process has terminated.

In this inquiry it is to be kept in mind, that we can know the state of parts in fatal cases only,—in 9 of 10 of which, perhaps 99 out of 100, the fatal event has been preceded by coma for at least hours, sometimes days. It is also to be remembered, therefore, that no evidence is afforded us of the state of the organs during the early stage of the disease, and that it is only where persons die suddenly from another cause, while the disease is still beginning, or at least only established, that this knowledge can be obtained. Such an opportunity I presume to be very rare, or almost impossible.

The facts above detailed show in this respect that fever proves fatal chiefly by the morbid changes which take place in the circulation of the brain and that of the lungs. The unnatural irritation which the former organ sustains in consequence of its vessels being distended with an unusual quantity of blood is the cause in the early part of the disease of the pain, weight, raving, and other mental affections, and in the latter part, of the stupor, coma, and convulsions which precede or introduce death. It has been generally believed that the blood moves more rapidly through these vessels than usual; but numerous facts lead to the conclusion, that its motion is rather retarded than accelerated. The effusion of serous fluid appears to be the result of overdistension and imperfect transition. The state of the pulmonary circulation appears to be the effect of, *1st*, gradually retarded motion of the blood in the pulmonary capillaries, and consequent congestion, and *2dly*, weakness of the muscles of respiration, the diaphragm, and intercostals, and of the action of the heart. The former is the cause of death.

These observations, which flow directly from the facts disclosed by dissection, are the few which I can attempt to offer as general conclusions on the most obvious or least doubtful parts of the process of continued fever. I have elsewhere shown in what manner they may be applied to establish a general theory of the process of fever.

§. III. ETIOLOGY.—To understand the causes or sources of continued fever, it is requisite to be aware of the circumstances under which it appears, and which are favourable to its formation.

1. It is ascertained by the researches of many physicians,—of Willan, Stanger, and Bateman in London, Ferriar and Percival in Manchester, Haygarth in Chester, Clark in Newcastle, Currie in Liverpool, and several others in England, by many observations by the physicians of Edinburgh and Glasgow, and other large towns, and by those of the physicians of Paris, Vienna, &c. that continued fever is almost never totally absent from the dwellings of the poorer and more needy orders of the inhabitants of such towns. Though no extensive or epidemic disease be found to prevail, *sporadic* cases, as they are termed, frequently appear; and it is generally possible to trace some connection between the several individuals who are the subjects of such sporadic cases.

2. During certain seasons, fevers of this kind are frequent, and spread extensively among the poor inhabitants especially, and in some instances extend to the more wealthy. In some seasons the extent, to which these fevers prevail, especially in manufacturing towns, where the population is dense, is very great. I have already alluded to several, and could mention others. Thus at Edinburgh in 1779, a fever with unusually malignant symptoms appeared in the hospital appropriated to the sick prisoners of war confined in the castle. Notwithstanding the usual precaution to keep the hospital insulated, many of the soldiers of the garrison, and some of the inhabitants of the city, were attacked with the disease. In the summer of 1781, a fleet of merchantmen with their convoy, consisting of several ships of war, anchored in Leith roads. The passage had been tedious, the crews had been on short allowance, and became sickly. Between the beginning of July and 9th August, the Suffolk landed 126 men in fever, of whom 23 died, and the Egmont landed 40, of whom 8 died. Some of the rest being quartered in Leith, many of the inhabitants were seized with fever, and the disease prevailed for several years after, both in Leith and Edinburgh. (Hamilton, p. 32, 33.) In April 1821, fever was conveyed from Manchester, where it was prevailing extensively, to Chester, where it spread pretty widely, till checked by the usual means. In such circumstances the fever is said to be *epidemic*.

3. In some instances the source of such fevers is not obvious, and is concealed even to the most vigilant examination. Such difficulty occurs chiefly where the disease is sporadic, and has

given rise to the notion, that fever may occur originally, and spontaneously, or without being derived from contagion. When it is epidemic, or affects great numbers, it can generally be ascertained, that the persons of those affected have been in the vicinity of others already labouring under fever, or, at least, capable of communicating it, or have been in actual contact with their persons, or with articles of clothing or apparel worn by them. The disease is then said to be communicated by *infection or contagion*; and the existence of a subtle vapour, termed *morbid effluvium*, is inferred as the channel of this infection or contagion. The substances in which this effluvium is lodged, and by which it is conveyed, have been called *fomites*.

Haygarth denies that the clothes of medical or other visitors can become *fomites* (p. 54;) and appears to think that contact with the skin or secretions of the patient are necessary to render articles of clothing capable of communicating the disease. This appears very probable, but has not yet been determined in a satisfactory manner. Bateman shows that even these may be handled and put in close contact with persons in health without communicating fever; and even thus the argument of Dr Haygarth loses its force.

4. There are therefore two modes by which fever is believed among physicians to be communicated. One when the effluvium is conveyed by the air, or without the direct contact of the clothing of the affected individual; the other, when it has been conveyed by the clothing of the individual, or by any other suitable substance which has been in contact with the persons. Of the first mode, examples are found in the sickness mentioned by Stow at Oxford assizes in 1577, and in that of the Old Bailey, London, in 1750, in which no actual contact took place among the persons of those who were attacked; and perhaps in the cases of Drs Akenside, Russel, Grieve, and Mr Waring, who, it is said, received the infection in the consulting-room of St Thomas' Hospital.

Of the second, we have examples in the hospital fevers mentioned by Pringle in the campaign of 1742, (p. 16,) 1743 (p. 22,) at Hanau after the battle of Dettingen, and at Worms the same year, where the disease was communicated by the cloth of old tents to tradesmen in Ghent, in several instances already mentioned, and in various instances related in Dr

Clark's Collection of Papers, (p. 48,) and in Jackson's account of the sickness of the Buff at Dorum in 1794-95, (p. 28.)

5. We learn from Howard's account of the State of Prisons, that this disease was very frequent in the prisons of England, but quite unknown in those of the continental countries. This indefatigable observer found it in the Wood Street Compter, London, in 1773; in the Savoy in 1776; in the county jail of Hertford in 1774 and 1776; in that of Maidstone in 1776; in the county bridewell of Dartford in 1774; in the town bridewell of Cambridge in 1779; in the county jail of Aylesbury between 1774 and 1776; very fatal in the county jail of Bedford about twenty years before his last visit in 1776; in that of Warwick in 1772, when it killed the keeper and several prisoners; and in the county bridewell at Southwell in 1772-73; in the county jail of Shrewsbury repeatedly; in the county jail of Monmouth in 1774, where it killed the jailer, several prisoners, and some of their friends; in the county bridewell of Usk, where it at one time affected the keeper, his family, and several prisoners, and killed not a few; in Gloucester Castle in 1773, when many died, and in 1774, 1775, and 1776, when there were always some persons sick; in the county jail of Winchester, where twenty persons and the surgeon died of it in one year; in the county bridewell of Winchester, which has been fatal to vast numbers; in the bridewell of Devizes previous to 1774; in that of Marlborough in 1776; the county jail of Lancaster in 1774, where the keeper, his assistant, and all the prisoners but one, were ill of it, and where, a few years before, the keeper and his wife had died in one night; in the county bridewell of Taunton, where, in 1769, it had destroyed eight of nineteen prisoners; in the county bridewell of Thirsk in 1776; in the Liverpool borough jail in 1774; and in the county bridewell at Cowbridge in 1774, where many died. It was also known to prevail very much, and with great fatality, on board convict ships, so that it was not uncommon for considerable numbers of felons to die on their passage outward.

6. Though Howard did not find fever in the prison of Lausanne, nor any other of the continental prisons, and Dr Mounsey found no trace of it, either in the prisons of Moscow, or in those of St Petersburg, yet Pinel informs us, that he has observed the jail fever of Pringle, in all its varieties, in the infirmaries of the prisons of the Bicetre repeatedly, and in those

of the Salpetriere in 1793. More careful examination, it cannot be doubted, would show traces of it in other continental prisons. But it cannot be denied, that the prisons of Austria, and the German states in general, appear to be less afflicted with this disease than those of this country had been previous to the time of Howard, and perhaps for the first ten years of the present century. (See also the accounts of Lettsom, Hunter, and Jackson. *Endemic and Contagious Fever*, chap. i. p. 5, 45.)

7. During the late epidemic, the communication of the disease by contagion was very clearly shown. Not only did it spread with unusual rapidity in Edinburgh, in the closes and alleys adjoining to the Cowgate, High Street, and Canongate, where, in general, the most needy and helpless of the population are accumulated in great crowds, but the persons of those who were not under the influence of accessory causes, and who were nearest to the sick, were attacked in much greater proportion than those not communicating with patients. The nurses of the Hospital and Queensberry House, the medical attendants, physicians, surgeons, clerks and dressers, and even the domestic servants of the establishment, were affected with the disease. Between November 1817 and August 1820, fourteen clerks, seven dressers, one surgeon, one matron, sixteen nurses, were attacked with fever. Among these there died one matron, one surgeon, two dressers, and five nurses. Three clerks had the disease twice, one three times. During the same period, one surgeon died not connected with the institution. Many similar instances occurred in other cities; but I restrict myself to this, as one of the strongest. Indeed, the whole history of the progress and diffusion of that epidemic shows that, from whatever sources it spring, it was in general communicated by contagion or infection.

8. It is ascertained by the observations of Hunter, Bancroft, and Jackson, that fever, such as we have described by the name of Jail Fever or Hospital Fever, is either rare or unknown in warm climates and warm seasons. Hunter informs us, that “during the whole time (two years) he remained in Jamaica, he never saw one instance of hospital fever, though the military hospitals were often as much crowded as they are in Europe;” and he also states, that he has never seen it in this country earlier than November; and though cases now and then occur in May and June, it generally becomes less frequent

as the weather becomes warmer. Bancroft, in like manner, states, that a severe contagious fever, which had prevailed extensively, and with much mortality; among the troops of General White's division in 1796, and which, after the embarkation on board the Bridgwater, was communicated to orderly men and nurses, became milder as they entered the warmer latitudes, and finally disappeared, or, at least, was not spread on their arrival at Barbadoes. The testimony of Jackson is to the same effect nearly, p. 34, "The power of propagation to nurses and attendants was visibly weakened."

9. Though it has been asserted by almost all physicians, that confined air and filth favour the presence and propagation of fever, and that it ceases to spread where cleanliness and ventilation are observed, Jackson remarks, that, in the St Domingo expedition, the Indiamen, where every thing was clean and in good order, and where there was ample space and full ventilation, were the most sickly of the transports; and that in several of the smaller and more confined vessels, where cleanliness was by no means observed, health suffered little. It is also observed, he states, that foreign soldiers suffer little in the transport of troops from Europe to the West Indies. These facts show very strongly that ship fever depends on a specific contagious matter.

10. Notwithstanding that fever is thus communicated and diffused, it is gratifying to know that the distance to which its material cause can be conveyed is very short, and that it is requisite to remain a considerable time in the vicinity of fever cases, or in an infected atmosphere, to produce the disease. The observations of Haygarth, Ferriar, Bateman, Percival, prove, that febrile infection (typhous infection of Haygarth) is almost never communicated in the open air by the common intercourse of society; that the infectious cause of fever may be confined to one apartment, without spreading to a whole house; and that it never is conveyed by the air for several feet from one house to another.

I have thus enumerated the principal facts which the industry of physicians has collected or discovered regarding the communication or propagation of fever; and I conceive they show clearly that when it prevails epidemically it is owing to contagious influence, whatever that may be. It still, however, remains to be discovered from what source this contagion derives its origin, in what manner it is formed, and to what agents

it owes its existence. On this subject we possess almost no satisfactory information; for what has been hitherto said on the subject is mere conjecture and supposition, or at most, plausible assertion. There is strong reason to believe, that, when great numbers of human beings are assembled together within such narrow limits as to render the air less capable of undergoing those changes in motion, which are constantly going on when it is unconfined, and where personal cleanliness is much or entirely neglected, such a change may gradually take place in the circulation and secretions of the living body as may render them capable of generating in a healthy person a diseased action, the symptoms and phenomena of which will constitute a fever. Such a change is more likely to take place in cold damp seasons than in dry airy ones; and its production appears further to be favoured by the long continuance of a series of seasons of this character. This I admit is little more than a theoretical generalization of the opinions of physicians on the origin of contagious fever; but it is all that can be at present asserted without departing too far from mere facts. I therefore leave the subject with this persuasion, that, as it does not admit of absolute certainty, it is useless to waste more time in carrying the inquiry farther than is practically necessary; for it is well known that contagious fever is formed and propagated only in situations where cleanliness, ventilation, and other necessary duties of this kind are grossly neglected.

§ IV. TREATMENT.—On few subjects have the opinions of physicians been more opposite and variable than on that of the treatment of fever. Methods believed to have the most opposite effects have been confidently proposed and strongly recommended at different periods; practitioners who have adopted these opposite methods have each reported their own success to be greatest and most uniform; and, in short, the treatment of this disease has fluctuated incessantly, according to the fluctuations of medical theory, and the fashionable doctrines of the day. Sydenham pursued a bold and empirical method, and, by copious blood-letting in fevers believed to be malignant, attempted to shorten the disease, or mitigate its symptoms. Huxham opposed this plan, and considered evacuations of every kind as injurious. Impressed with a profound veneration for Hippocrates, resolved to follow what he imagined to be the processes of nature in the management of fevers, he fancied the

resolution or coction to consist in cutaneous discharge, and was most partial to gentle diaphoretics. Blood-letting he admitted only to prevent inflammation, but he considered it contraindicated and injurious in contagious fevers. Pringle also recommended diaphoretics, vomiting cautiously, blood-letting, if there were symptoms of local disorder, and in the latter stages, snake-root, bark, and other substances of tonic properties.

Cullen, a theorist and systematist, regulated the treatment of continued fevers on the plan of the three general indications, the measures for the fulfilment of which were subdivided minutely, according to numerous individual circumstances. His individual therapeutic measures, however, were those of other practical physicians arranged under proper heads, and placed in such order as might give his system the appearance of accurate science. Brown, by partial views of the disease, introduced the fanciful distinctions of sthenic and asthenic diseases, the treatment according to the doctrine of stimuli, and the superficial but gratuitous hypothesis of excitement and collapse.

These hypotheses, in part or in whole, were, before the close of last century, entirely relinquished by all rational practitioners in the very countries which had given them birth; and when taken possession of by the Germans and Italians were defended, applied, commented on, or modified according as the caprice of the individual, or the fashion of the day might dictate, till succeeded by some newer or more attractive object.

Since their relinquishment by British practitioners, it appears to be tacitly admitted, that it is either impracticable, or unsafe, or useless to establish the treatment of fever on theoretical principles. We are, indeed, indebted to morbid anatomy for some information with regard to the natural tendency of febrile action, and the causes of death; but it must be admitted that the therapeutic information derived from this source is scanty, sometimes contradictory, and often unsatisfactory, compared with what has been ascertained by mere empirical trials. It was indeed by relinquishing theory entirely, and observing the effects of various tentative means, that Hamilton proved the utility of remedies which act on the alimentary canal; Currie showed the advantage of the cold affusion; Irvine, Sutton, and Burnett, the benefit of blood-letting; and it is by experimental measures chiefly that we now possess so much evidence on the efficacy of the plan by evacuation in general,

in the treatment of fever, in the writings of Mills, Armstrong, Stoker, Bateman and Percival in this country, and Hufeland, Hildenbrand, and Richter in Germany.

For these reasons, while I shall consider the treatment of fever on empirical principles, I shall study to reconcile them with correct theory. The remedies which have been found useful of late years are, emetics at the commencement only, purgatives, blood-letting, general and local, cold applied to the shaven scalp, cold affusion, cold washing or spunging, tepid washing, the use of cold or diluent fluids, either alone, or with various acid substances, and especially the free admission of fresh air.

Emetics.—The administration of remedies to empty the first passages (*primæ viæ*,) as the stomach and *duodenum* were termed, has been used on various principles at all times almost in the treatment of fever; and in modern practice they have been exhibited either to produce full vomiting, squeamishness, sweating, or a discharge from the intestinal canal. It appears to be now agreed that the only instance in which the exhibition of an emetic is expedient is at the beginning of the disease, when in slight attacks it certainly alleviates the headach, lowers the quickness of the pulse, abates the cutaneous heat, and produces sweating, either partial or general. A scruple of ipecacuan is the most convenient; and, if a grain of tartarized antimony be added, it acts with more certainty as a purgative. This medicine, succeeded by a proper dose of calomel, either alone or combined with jalap, has in some instances reduced a disease with the usual characters of fever to a slight sickness of five or six days' duration only; and may sometimes put a stop to the whole train of morbid symptoms. Its operation will be aided by immersing the feet in warm water, or rather by warm fomentations, or the tepid bath, when it can be conveniently used, and by the administration of diluent fluids, either warm or cold.

Purgatives.—Emetics are calculated chiefly for the early or initial stage of fever. Purgatives may be exhibited at any period, and are generally requisite through its entire course. There is reason to believe, that in no case of fever is the mucous surface of the alimentary canal in a healthy state; and the vomiting, constipation, or even looseness, with the furred, mucous, or blackened tongue, and the tense and occasionally painful feeling of the epigastric and umbilical region, are symptoms which indicate the disordered state of this membrane in the

stomach, small intestines and great intestines. Dr Hamilton, from observing the beneficial effects of antimonial medicines when they moved the bowels, was led to depart from the timid administration of these capricious medicines, and the glyster recommended by Cullen, and to exhibit remedies, on the purgative effect of which more reliance could be placed. His observations, which have been fully confirmed by those of other practitioners, show that it is indispensably requisite that the bowels be moved daily during the course of fever, in order to discharge completely the feculent matter, which is naturally contained in the intestines, and which, during the process of fever, becomes an additional source of irritation and morbid secretion. He does not, however, advise an unusual secretion into the cavity of the intestines, or the practice of procuring copious watery stools.

The general results of his observations are as follow. *1st*, Purgative medicines are given with safety in fever (typhous,) to evacuate the contents of the bowels. *2d*, Under this limitation they may be exhibited at any period from the commencement to the termination of the fever. *3d*, The early exhibition of purgatives alleviates the first symptoms, prevents the accession of more formidable ones, and thus shortens the course of the disease. *4th*, Re-convalescence from fever is greatly promoted and confirmed by the preservation of a regular state of the body. The same means secure against the danger of relapse.

The purgative medicines which are most expedient in the treatment of fever are, calomel, calomel and jalap, compound powder of jalap, aloes, in either of the pharmaceutical preparations, solutions of any mild neutral salt, as Glauber's salt (*sulphas sodæ*,) Epsom salts (*sulphas magnesicæ*,) Rochelle salt (*tartras sodæ et potassæ*,) or tasteless salts (*phosphas sodæ*,) Infusion of senna, either alone or combined with one or other of these solutions, or with a portion of cream of tartar, forms a very effectual and certain cathartic. I have also found the compound colocynth pill with the blue pill, in doses of ten or fifteen grains of the former to five or ten of the latter, a most effectual and beneficial purgative in fever. For particulars, the formulæ at the end of the volume are to be consulted.

Blood-letting, general and local.—Though this remedy was much and successfully used by several of the older physicians, and was shown by Dover to be beneficial in the malignant

spotted *Typhus*, a great prejudice appears to have risen against it by the authority of Huxham and Pringle, and others who dreaded what they termed putrescence. This prejudice Cullen certainly strengthened, perhaps unintentionally, but yet with sufficient effect, by declaring, that "in many cases blood-letting should be avoided; and that even although during the inflammatory stage of the disease, it may be proper, it will be necessary to take care that the evacuation be not so large as to increase the state of debility which is to follow." (141.) In the system of Brown, which was adopted by several practitioners after Cullen, this "debility" was made to perform a much more prominent character; and blood-letting was proscribed in the management of fever, as the most deadly and cruel error that could be perpetrated. It is now long since the profession have recovered from this imaginary terror; and it may be safely asserted, that there are few measures the propriety of which is so clearly obvious as that of blood-letting in certain forms of fever, and under certain circumstances. The indiscriminate prohibition of blood-letting and evacuation generally in fever, indeed, originated in ideas on the nature of fever, physiologically and pathologically erroneous.

It is to Dr Thomas Sutton chiefly that we are indebted for the first attempts to surmount the fears of debility in the use of venesection as a remedy for fever; and his Practical Account, published in 1806, contains the most unequivocal and satisfactory evidence of the influence of this evacuation in mitigating the intensity of the symptoms of *Synochus*, and preventing their subsequent transition into *Typhus*. The pathological researches of Clutterbuck and Beddoes in 1807 added confirmation to the practice. Dr Irvine soon after showed the necessity and utility of it in the continued fevers of Sicily; Stevenson used it with advantage in the treatment of the Corunna fever; and Muir in the continued fever of this country. At no great interval, the works of Mills, Grattan, Rotterdam, and Armstrong, and of the German physicians to whom I have already alluded, furnished the fullest evidence of its merits and its application; and since that time it may be considered as generally admitted as an acknowledged remedy in the cure of Continued Fever. The work of Dr Welsh, and others of less moment, were too late to be entitled to any merit as original treatises; but they may be regarded in the light of documents to

show the general efficacy of the measure, and the great extent to which it may be carried without injury.

In order that blood-letting may exercise a curative effect in *Typhus* and *Synochus*, it is necessary to employ it in the commencement and early stage of the disease, and to confine its employment chiefly to the first septenary period. I do not, indeed, pretend to fix an exact time for its use, or to say that, practised before the seventh day, it is always beneficial, and after that period always injurious; but the experience of all febrile epidemics shows that this evacuation, if practised at all, should be practised as early as the physician sees the case and recognizes its nature. The reason of this will appear from the following considerations.

As the capillaries of the brain, and its envelopes, those of the lungs, and those of the gastro-enteric organs, and the spleen and liver, are much overloaded with blood, which moves every hour more slowly, and is tending to stagnate and be decomposed, or even to produce serous or sero-sanguine effusion, capillary disorganization, and hemorrhage, the most likely mode to counteract the progress of this process is, to diminish the mass of blood, and thereby place the capillaries of these different parts in the situation of contracting upon the residue, and propelling their contents in the natural direction, and with due velocity. In order, however, that these vessels may perform this duty efficiently, it is indispensable that the evacuation be performed early, before the blood in them has become almost immoveable, and thereby decomposed, and before serous fluid has been effused into the subarachnoid tissue or cerebral ventricles, and before blood or sero-sanguine fluid has become extravasated into the pulmonic filamentous tissue. It is impossible to determine in a general manner when these events may take place, for in one set of cases they may occur before the 7th day, and in others not till after the 10th or 11th; but it is important to bear in mind, that, after they have occurred, no advantage can result from the evacuation.

The quantity of blood to be drawn in *Synochus* and *Typhus* must vary according to the symptoms, the age, and strength of the patient, the stage of the fever, and the character of the epidemic. In cases with much headach, flushing of the face, suffusion of the eyes, throbbing of the temples, and painful constriction at the epigastric region, with tense pulse, blood-letting is more strongly indicated, and is better borne than in those in

which the patient complains little, has a dull dingy tint of complexion, a muddy eye, and is verging towards stupor. In young vigorous adults, I have generally drawn from 18 to 24, or even 30 ounces, with benefit; and in most instances it will be requisite to draw not less than 18 ounces on the onset of the disease. In the aged and enfeebled, and after the disease has subsisted for several days, more caution is requisite; and it is rarely prudent to draw more than 12 or 15 ounces from the arm, while the congestion of the head may be relieved by local bleeding, by means of leeches.

The effect of general blood-letting is very rarely to shorten the course of the disease; and the practitioner must not be discouraged when he observes the symptoms proceeding. Its great use is to prevent such organs as the brain, lungs, spleen, liver and stomach, or bowels, from sustaining injury from the capillary distension, in which the disease consists, and to enable the disease to finish its career without injuring these organs.

When the disease is conceived to be too far advanced to derive advantage from general blood-letting, when the patient is feeble, or the countenance dingy and oppressed, the eye dull, and rather turbid, and the scalp hot, and the temporal arteries distended, yet with feeble action, local bleeding from the temples, the forehead, or the occipital or occipito-cervical region, by means of 12, 18, or 20 leeches, is the appropriate mode of evacuation; and it may be requisite to repeat this several times before the symptoms undergo amelioration. This mode of evacuation I have used for 12 years; and while I have invariably found it to be beneficial, I have never observed it to be detrimental. Its effect is to diminish or remove pain of the forehead, orbits, or temples, or beating within the head; to abate the suffusion of the eyes and render them clear; to give the countenance a clearer hue; to prevent the approach of delirium or stupor, or *typhomania*; or to diminish and remove them if already established.

In instances in which, when the symptoms of encephalo-meningeal oppression are thus abated or removed, the patient still seems to suffer from anxiety and constriction of the epigastric region, and in which the epigastric or umbilical region is distended and painful, the tongue continues dry and loaded with dark-coloured mucus, and the bowels are inadequately affected by medicine, blood should be drawn from the epigastric by means of 12 or 18 leeches, after which the anxiety and epigas-

tric load abates, the tension subsides, and the intestinal discharges become more copious and natural. For vomiting, hiccup, or the persistance of constriction after these means have been employed, the most effectual means are a sinapism or blister applied to the pit of the stomach.

In cases of *Typhus* or *Synochus*, in which the respiration is rapid and panting, the chest sounds dull, with indistinct vesicular murmur, and the crepitous or subcrepitous rattle, the discharge of 6 or 8 ounces of blood drawn from between the scapulæ, or the application of leeches to the chest, is sometimes beneficial. I have also seen remarkable benefit in similar cases from tartrate of antimony, given in doses of 4 or 5 grains, in 2 or 3 ounces of water.

In this state also, blisters applied over the chest, or between the *scapulæ*, are very useful.

The influence of blood-letting, general or local, is much promoted by keeping the shaven scalp cool, by the frequent or constant use of cloths dipped in cold water, the occasional use of the cold affusion upon the head, and the application of ice. The latter agent I have seen in several instances produce the first abatement of delirium, after all other means had been unavailingly tried for several days.

By the energetic use of the means now specified, combined with the regular evacuation of the bowels daily, or twice or even three times daily, the capillaries of the brain, lungs, and intestinal tube, will be kept so free from distension, that in general about the ninth, eleventh, or fourteenth days, some alleviation of the symptoms will appear, in the patient being less restless during the night, and in his eye becoming clearer, and his countenance less flushed and oppressed. If, however, notwithstanding the use of the means now enumerated, delirium is unabated, and is verging towards stupor, or if the case or cases be seen too late for the employment of these means, and the patient is becoming typhomaniacal, then the application of a blister over the vertex, or to the occipital or occipitocervical region, should be applied. The medical attendant, however, should, in the application of these agents, beware not to confound the tendency to natural sleep, which generally recurs at this time, with stupor or coma. This he will be able to do, by observing that there is no muttering delirium, or that this has entirely ceased, while the respiration remains under 30 or 32, is free from panting or mucous rattling, the

skin becomes moist, and the patient voids his urine with ease. If the urine be retained in the bladder, it indicates increasing oppression of the brain and spinal chord, and the catheter should be used regularly four or five times daily.

It is of great importance, in the treatment of *Synochus* and *Typhus*, to restore the circulation and secretion of the skin, and the secreting glands to their healthy state ; and though the functions of these organs are much under the influence of the remedial agents already enumerated, it is always proper to employ those means which may operate more directly in this manner. I have already shown that the most valuable agents in acting on the skin are washing and sponging with warm water and soap, tepid or cold sponging, cold affusion upon the head or person, and warm fomentations of the feet. Cold affusion is contraindicated only where there are symptoms of bronchial, pulmonic, pleuritic, cardiac, or enteric disorder. Warm fomentations by flannel cloths wrung out of hot salt water, should be employed every night, or every second night, when, without fatiguing, they tend to relax the skin, abate restlessness and jactitation, and induce sleep. With the same view, warm bottles should be kept at the feet, in the feeble, the aged, and in the congestive form of the disease.

Next to cold affusion, cold drinks are the best diaphoretics in fever.

The diaphoretics containing opium are hurtful in the early stage of fever, while the arteries and their dependent capillaries are still too much distended. But the saline diaphoretics, of which the most useful are the citrate and acetate of ammonia, may be employed from the commencement. Towards the close of the disease, when the previous evacuations have removed the inflammatory and congestive state, it is sometimes advantageous to administer opiate diaphoretics in the form of the antimonial anodyne draught (*haustus anodynus antimonialis*.)

On the employment of diuretics in fever, it is unnecessary to add any thing to what has been said in describing the treatment of Simple Continued Fever.

Under the use of the saline powder, the *petechiæ* occasionally acquire a brighter tint, the eye becomes clearer, and the complexion changes from a dingy or leaden hue to a clearer and more florid aspect.

Under the judicious employment of two or more of the agents now specified, most cases of *Synochus* and *Typhus* will

begin to ameliorate about the 11th, 14th, 17th, or 21st days. *Delirium* and *typhomania* abate, and give place to natural sleep; the eye and countenance become clear; the fur on the tongue breaks up, and is detached; the pulse becomes 10 or 12 beats less frequent; respiration is performed freely; epigastric oppression disappears; the bowels become more easily opened; and the urine is secreted copiously. If, however, these changes do not take place, and the febrile disorder continues little abated, notwithstanding the diligent use of remedies, it must be presumed that the capillary vessels continue still to be distended, while the large vessels are comparatively empty and flaccid. In this state, which is indicated by great feebleness of all the vital actions, one of two conditions may take place. Either the blood, dark and unaerated, remains fixed in the capillaries of all the organs, oppressing them by a species of irrecoverable *asphyxia*, or it may be elicited from these vessels by the veins too slowly, to act on the right ventricle of the heart, and, consequently, in insufficient quantity to be transmitted by the lungs to the left auricle and ventricle, and then produce death by defective cardiac action.

To counteract these results, stimulants become necessary; and it is chiefly in removing this state that the administration of wine in *Typhus* and *Synochus* is beneficial. The wine not only acts as a local stimulus to the stomach, but, being absorbed by the veins, is circulated to the heart, and thus tends first to rouse the pulmonary, and then the general circulation. In this course, also, it affords to the veins a gentle distension, and enables these vessels to exert their absorbent powers on the capillaries, which thus become gradually unloaded, while the fluid arriving from the arteries progressively tends to restore to the blood its former mobility and normal rapidity of motion. It is in this manner that wine is instrumental in removing delirium and promoting natural sleep, in diminishing the frequency of the pulse, in rendering the tongue clean, and the skin moist, and in restoring the secretions generally.

With the intention now mentioned, wine may be given to the extent of from two to six or eight ounces in the course of twenty-four hours. Beyond eight ounces in general, I never saw it beneficial, and I believe that it is then injurious. On the contrary, I have seen it most advantageous when given to the extent of two ounces in the evening, when it generally acts like a hypnotic, and procures refreshing sleep. It is

highly injurious in the early stage of fever; and I have no doubt, that, when patients recover under this early and continued use of wine, it is a recovery not in consequence of, but in spite of, the treatment. Never, in short, was a more irrational or unphysiological method, than that of administering wine indiscriminately at the commencement of *Typhus*. It then, by augmenting the capillary distension, and retarding the motion of the blood in the capillaries of the brain and lungs, aggravates pain of the head and delirium, paves the way for meningeal effusion, induces or augments congestion of the pulmonary capillary system, renders the respiratory motions short, frequent, and incomplete, and, by inducing pneumo-bronchial congestion, or a species of bastard peripneumony, with tracheo-bronchial rattling, precipitates the fatal termination.

The same observations apply to spirits diluted or undiluted. In some instances, nevertheless, in which the patients have been accustomed to the previous use of these stimulants, it is advantageous, at the time when the venous trunks are beginning to be emptied most completely, to administer these agents with some freedom.

Much has been said regarding the influence of these stimulants on the nervous system; and many vague and contradictory doctrines have been advanced on their power of counteracting what is called *nervous debility*. It is needless to inquire into the merits of therapeutic rules, which rest on erroneous and hypothetical physiological and pathological principles. The debility named *nervous* in fever is precisely the empty state of the veins and the venous division of the capillaries, with the slow motion and almost complete stagnation in the latter vessels, and the consequent want of the usual tension afforded to the different organs, but especially the brain and spinal chord; and the only mode of removing this state, and counteracting its effects, is to use means adequate to supply this vacuity, and restore the necessary tension,—which is then effected by the vinous and spirituous stimulants.

Though port wine is most generally used for removing this state, and is frequently much relished by patients, it may in certain cases be in the pure form too stimulant; and it should then be given with an equal portion or half a portion of water. Sherry or Madeira may be employed in the same manner, and even domestic wine, if it do not gripe and irritate the bowels, may be also advantageously used. The most useful, however, of all

the forms of vinous stimulants, and that which is seldomest detrimental, is sound claret, which, administered to the extent of from 4 to 8 glasses in the course of 24 hours, I have repeatedly seen remove very ominous states of debility in fever. It then operates both as food and drink, renders the tongue clean, the skin soft, the intellect clear, the muscular motions steady, and gently but effectually moves the bowels, and causes a copious flow of dark-coloured hypostatic turbid urine.

Another liquor very useful in removing this state, and exciting the capillaries and restoring the different secretions, is tea or coffee. Small quantities of infusion of green tea are often most efficacious in supporting strength and promoting recovery.

On the use of the other stimulants, as camphor, ammonia, and musk, I refer to what has been said under the head of yellow fever, remittent and simple fever. Of these it may in general be said, that, if the disease has been treated with energy and promptitude at the outset, they are almost never requisite; and where these means have been neglected they are very seldom useful.

On the subject of food during fever and in convalescence a few words may suffice. While solid food, and especially animal matters, are loathed and rejected, and drink is taken with avidity by patients in fever, it is certain that all solid nutriment is injurious; and the patient should be restricted to the use of the ptisans, the acidulous drinks, and such fluids as whey, small beer, and pure water, so long as the tongue is loaded, the skin hot and dry, and the pulse quick. Solid food should be withheld till the patients ask for it, and then it should be confined to panado, sago, tapioca, arrow-root, oatmeal gruel, flummery, or thin porridge. Animal soups and solid animal food are almost invariably the cause of relapses; and to these the patient should return very gradually, and after the tongue has been many days clean, and the appetite good. To counteract accumulation, the bowels should be emptied daily; and the occasional use of the warm bath, with frequent changes of flannel and linen, will tend to re-establish the healthy action of the skin.

In all cases of Typhous or Synochal fever it is necessary for the attendant to prevent if possible the occurrence of erythematous chafing of the skin from pressure, or the irritation of the discharges, or at least, if commenced, to oppose its extension. The most effectual means of obtaining this object is to anoint the parts most pressed, especially the *sacrum*, with hog's lard se-

veral times daily, and to apply over this the saponaceous liniment. The former diminishes friction, and defends the skin from the irritation of the discharges; the latter strengthens it, and abates morbid tenderness. The *linimentum albuminis ovi*, so much commended for this state, is inert and useless. If, notwithstanding the diligent use of these applications, the cuticle is abraded in points, and the corial surface is exposed, it is then requisite to conjoin with the use of the lard that of a solution of sulphate of zinc or acetate of lead. And if, notwithstanding these means, the skin and cellular tissue become more or less extensively killed, the separation of the sloughs must be awaited under the use of the emollient poultice and resinous ointment. The warm dressing (*linimentum terebinthinatum*) is much used for the same purpose; but it causes intolerable smarting, often extremely distressing and exhausting to patients in that feeble state, without any adequate advantage.

SECTION III.—FEVER WITH A TENDENCY TO GANGRENOUS INFLAMMATION AND AFFECTION OF THE GLANDS.

PLAGUE.

Due Libri de Fabricio Boido Trotto Medico Alexessandrino dal Castellaccio de Modo di Conoscere preservarsi, et curarsi, della Febbre Pestilente. Vergelli. 1577. 4to.—Isbrandi de Diemerbroeck, M. D., *Tract. de Peste*. Amst. 1665. Thomæ Sydenham, *Opera Universa*. Lond. 1705, Sectio ii.—The History of the Great Plague in London in the year 1665, containing observations and memorials of the most remarkable occurrences, both public and private, that happened during that dreadful period, by a Citizen (Defoe), who lived the whole time in London. Lond. 8vo. 1819.—Einiger Medicorum, &c. Letters on the Plague which prevailed in Prussia in 1708, by Kanold. 4to. Breslau, 1711.—J. F. Boetticher, *Morborum Malignorum, imprimis pestis et pestilentiae brevis et genuina explicatio*. 8vo. Hamb. 1713.—J. G. N. Dietrich Untersuchung von der Pest die herrscht zu Augsbουργ im 1708. 4to. Augsbουργ, 1714.—Peima de Beintema, *λοιμολογια, sive Historia constitutionis pestilentis anno 1708, grassantis*. 4to. Viennae, 1714.—B. A. Berlinger, *de peste in genere et huc epidemica modo grassante in specie*. Herbpol, 1714.—Alkofer Von der Pest de Ratisbonne. 8vo. 1714.—C. B. Behrens, Bericht zur Pest. 8vo. Braunschweig. 8vo. 1714.—*Crusii excerpta quædam ex observatis in nupera peste Hamburgensi*. Jenae, 1714.—L. A. Muratori Del Governo della Peste et della maniera de guardarsene. 8vo. Modena, 1714.—*LOIMOLOGIA*, or an Historical Account of the Plague in London in 1665, with precautionary directions against the like contagion, by Nathaniel Hodges, M. D., &c. To which is added an Essay on the different causes of Pestilential Diseases, &c. &c. by John Quincy, M. D. 2d edit. Lond. 1720.—Relation de la Peste de Marseille. Donnée par Messieurs Chicoyneau, Verny et Soullier, M. D. Marseille, 1721.—A Historical Account of the Plague at Marseilles, by J. Soame. Lond. 1722.—Discours Academique, Latin et Francois, sur la Contagion de la Peste de Marseille, par M. Deidier. Montpellier, 1725 and 1732.—F. Chicoyneau, *Traité des Causes des Accidens et de la cure de la*

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§ I.—NOSOLOGICAL AND SEMEIOGRAPHICAL CHARACTERS.

—The terms *λοιμος*, *pestis*, Plague, Pest, or Pestilence, have been used indiscriminately to denote any disease which prevailed very generally in a community, and proved fatal to a considerable proportion, occasionally the majority of those whom it attacked. In this sense, these terms have been applied at different periods of the history of medicine to a very great number of different diseases. Thus the term *λοιμος* was applied by the Greeks to designate a species of epidemic remittent fever; and the plague of Athens described by Thucydides is manifestly an epidemic form of the same disease, which has been at all times in the summer season endemial on the coasts and islands of the Mediterranean and Archipelago. The instances of *λοιμος*, so frequently mentioned by Dionysius of Halicarnassus, and of *pestis*, so often mentioned by Livy and other Roman historians in the early history of the city of Rome, are manifestly the remittent or remittent-continuous fever, which has been at all times the native product of that district, and which acquired after inundations of the Tiber, or a certain train of weather, the characters of a very generally diffused, a very malignant, and a very mortal distemper. Numerous instances of a similar inaccurate mode of expression occur in designating the remittent fevers of the middle ages and of modern times; and we find even in the early history of the colonization of the West Indian islands and the United States, frequent examples of the term Plague being applied to the remittent of these regions, and especially to epidemic attacks of yellow fever; and it is remarkable that Sauvages follows the example of Labat, in applying the denomination of Plague (*pestis*,) to the disease which was reported to have been brought in 1686, in the *Oriflamme*, from Siam to Martinique, and to that which Dover describes as prevalent among his crew after the sacking of Guayaquil.

The term Plague has also been applied to Petechial or Spotted Fevers, and certainly with some greater justice; since the disease, to which alone the term should be confined, often assumes the characters of a malignant Typhous Fever with petechial spots, stripes, (*vibices*,) and hemorrhages; and in so many instances its appearance has been preceded or introduced by spotted fevers of malignant and fatal characters, that it has been frequently mistaken for that disease. This was the case with the plague of Nimeguen in 1635 and 1636, and those of London in 1609, 1636, and 1665; and Orraeus informs us, that, subse-

quent to the plague of Moscow, numerous deaths from Petechial Fever took place in the Ostrog, a large prison of that city.

During the middle ages, the term Plague was applied not only to the effects of the syphilitic pox, but to small-pox, to St Antony's Fire or the Gangrenous Rose, (*Erysipelas gangrenosum*, *Erysipelas pestilens*, *Mal des Ardens*,) a disease then very prevalent, to epidemic sore throat (*Scarlatina vel Cynanche maligna*,) to the sweating-sickness, and even to such diseases as the *Raphania* of Linnæus and Sauvages, and the disease produced in Sologne by the use of spurred-rye. In the year 1348, the term plague was applied to several different distempers, and among others to a species of gangrenous peripneumony, terminating in passive hemorrhage from the lungs.

More recently we have seen the term used in this indiscriminate and inaccurate manner to fever, yellow fever, and cholera.

These errors it behoves the accurate physician to avoid, and, both with a view to sound pathology and efficient prophylactic and therapeutic measures, to frame a distinct idea of the disease justly termed Plague.

By the term Plague or Pestilence in modern times, is meant a distemper in general attended with febrile symptoms, and much perversion of the circulation of the internal capillaries, accompanied with, or speedily giving rise to, purple or dark-coloured petechial spots and stripes, or *vibices*, carbuncles upon the skin, and buboes of the lymphatic glands. From the presence of the carbuncles, it is sometimes denominated the Carbuncular Plague, and from that of buboes, the Glandular Plague. (*Pestis Anthracoides*, *Typhus Anthracicus*.—Hildenbrand.)

All cases of plague commence, and are attended with more or fewer of the symptoms of fever; but in different individuals these symptoms vary much, and tend to give the cases a peculiar character.

In the most usual form an irresistible and overpowering sense of weariness and fatigue, slight shivering (*horripilatio*,) or transient chills, squeamishness and sickness, with more or less anxiety and weakness at the epigastric region,—a sense of weight and confusion of the head, with more or less giddiness, and bruising pain of the loins, and even the extremities, are the symptoms by which the disease is introduced, and which, therefore, must be regarded as a cold stage. The duration of these symptoms is in general short, and is rapidly followed by a train

of phenomena very anomalous in their character, according as one organ is more or less affected than another.

The weight or pain of the head and giddiness proceed to complete confusion of recollection and thought, with occasional stupor and muttering delirium (*typhomania*.) The countenance is fixed and haggard, or frequently moved by involuntary spasmodic twitches; the complexion is pale or dingy-coloured, occasionally chequered by a slight flush,—or it may be bloated, turgid, and of a dirty livescent tint; and the eyes are suffused or injected, and muddy, but sparkling or glaring, as if unusually prominent, and restless, or dull, staring, and sunk apparently in the orbits.

At the same time, if sufficient sensation still remain, the epigastric anxiety is found to be converted into a fixed internal pain, referred to the region of the heart, not unfrequently accompanied with a sense of agonizing constriction, and burning heat, so as to cause the patients often to scream out, and always to change posture. The distinctness of this symptom, however, always depends on the degree in which the vessels of the brain and nervous system are affected; for if they are so much disordered as induce stupor or general *anaesthesia*, more or less complete, this symptom, however intense be its pathological action, is not strongly manifested.

The pulse is always small and oppressed, sometimes not quicker than natural, often fluttering, irregular, or even intermitting. The character of natural frequency appears to be the circumstance which has led to the assertion, that cases of plague are void of fever. But as fever does not consist in the increased number of cardiac contractions in a given time only, but in the general disorder of the capillary vessels, and the consequent subversion of nutrition and the secretions, this distinction is totally inadmissible. If the pulse continue small, creeping, and oppressed, it indicates the intensity and malignity of the disorder, and is connected with the excessive loss of power in the capillaries, and the consequent fixed accumulation of blood in that order of vessels. A stronger, more open, and manifest action of the heart indicates not only less oppression of the capillaries generally, but less loss of power in those of the heart.

The squeamishness and sickness of the incipient stage in many cases terminate early in vomiting of large quantities of yellow or greenish-coloured matters; but in other cases, again,

little or no vomiting occurs; and this symptom is neither so constant nor so severe as in autumnal remittent fever. Squeamishness (*nausea*), however, with epigastric anxiety, are uniform symptoms, and continue more or less urgent during the whole course of the disease. These symptoms of gastric or gastro-duodenal oppression are always in plague connected more or less intimately with the state of the skin. For so long as the skin continues dry and imperspirable, or clammy and unctuous, with a degree of coldness, the squeamishness and epigastric oppression continue, the vomiting recurs more or less urgently and frequently, and the patient is restless, and in a state of incessant jactitation; but as soon as the skin becomes warm, moist, and perspirable, vomiting ceases, squeamishness abates or disappears, epigastric anxiety subsides, and the restlessness and jactitation are palpably abated.

The bowels are in general confined at the commencement of the disease, and very difficult to be affected by purgative medicines. Towards the close of the disease, that is, between the beginning of the third and end of the fifth day, however, looseness often ensues, and continues to the last; or bloody or sero-sanguine fluid is discharged from the intestinal mucous membrane. Less frequently looseness comes on during the course of the first day. The discharges are in general less fetid and offensive than in subcontinuous and remitting Tertian Fevers.

The skin, it has been already mentioned, is in general dry and imperspirable, sometimes hot, sometimes cold and clammy, or bedewed with partial and ineffectual sweats.

The urine is in general very scanty and high-coloured, but without sediment, and sometimes it is altogether suppressed or retained in the bladder, or escapes insensibly in bed.

The most characteristic phenomena of the Plague, however, are found in the state of the voluntary motions. In general, these are very much impaired, and the individual loses all control over the muscles. Thus the speech is indistinct, and he is unable to articulate, or falters and speaks thick and indistinctly when he attempts it, and continues in a confused restless muttering for hours. The tongue is exceedingly tremulous, sometimes from the first day of the disease, often on the second, and always on the third; and the organs of speech generally are often so much struck, that in cases in which reco-

very takes place, an impediment may remain for months. With these symptoms all the muscular motions are exceedingly unsteady; and the patient is utterly unable to perform any duty requiring either strength or precision. If the attempt be made, it almost invariably throws the extremity into convulsions, or vibratory involuntary twitches; and, indeed, the hands and feet are almost constantly agitated by vibratory trembling. *Subsultus*, nevertheless, is not very frequent in plague. Connected with this feebleness are twitches of the face, and the general expression of livid distension and stiffening of the countenance, giving, with the suffusion of the eyes, the expression of a person under the influence of intoxication. This symptom is so uniform that it is never wanting, and has been recognized more or less distinctly in all pestilential epidemics. Lastly, there is from the first more or less tendency to fainting, and though in his delirium, or otherwise, the patient may attempt the erect position, he is sure to fall down in a swoon more or less perfect.

At the commencement of the disease, or on the first day, the patient, before the sensibility or *coenaisthesis* of his tissues is much enfeebled, experiences in different parts of the body wandering pains, various in acuteness; and these are gradually concentrated to the groins, arm-pits, neck, or certain points of the trunk and extremities, with darting and stinging pain, while the wandering aching sensations cease to be felt. Those which are concentrated in the groin and arm-pit are found to be connected, in general in the course of the second day, with enlargement of one or more lymphatic glands, whereas those which are referable to certain spots of the trunk or extremities are found to be connected with hard painful spots of the skin, which are either of a bright fiery red, or of a violet, livid, or purple tinge, but inclining to brown or black. The former constitute the Pestilential Bubo; the latter, the Pestilential Carbuncle.

Most instances of Plague are accompanied, in the course of the second or third day, with more or less extensive distribution of dark-red *stigmata*, petechial spots, and violet, purple, or black stripes (*vibices*) on the skin, exactly as if it had been much bruised or beaten. Hemorrhage also may take place from one or more of the mucous surfaces. The most frequent regions are the nose and intestinal tube, in both sexes, and the

womb in females. In those predisposed to pulmonary disease, or who have previously laboured under spitting of blood, hemorrhage from the bronchial mucous membrane or the lungs is liable to recur.

Of the hemorrhages the degrees are various. Bleeding at the nose on the first or second day, in small quantity, is of no great moment; but if copious and repeated, and accompanied with violet-coloured or black *petechiæ* and stripes (*vibices*,) it is generally a fatal symptom, and indicates disorganization of the mucous capillaries.

In females labouring under plague, hemorrhage from the womb, amounting to menorrhagia, is not uncommon; and one of the effects of the disease is also to induce menstruation, premature in date, and excessive in quantity. A similar perverted action takes place in pregnant females, in whom plague induces abortion, with more or less profuse bleeding. The fatal issue is then almost inevitable, and the patient perishes either in the agonies of child-birth, or a few hours after that event.

Such are the general characters of Plague. In every epidemic, however, it assumes so great a variety both in the kind and the intensity of the symptoms, that it has been found indispensable to distinguish plague into several varieties. The limits of the present work do not allow me to enter much into their details; but I shall advert briefly to a few circumstances which I think will illustrate these modifications and their causes.

1. It appears from the concurrent testimony of Diemerbroeck, Chicoyneau, Chenot, De Mertens, Orræus, Russell, Assalini, Faulkener, and Tully, that Plague not unfrequently proves fatal in the course of the first day, or at most upon the second, without the occurrence either of buboes or carbuncles. The distemper in this class of cases appears to act like an immediate poison, evincing its energy chiefly in the capillary system in general, and that of the brain in particular, inducing promptly a species of loss of transmitting power in the capillaries, and consequent accumulation and congestion in all the organs, but most remarkably evinced in the vessels of the brain and spinal chord. In this form the face is bloated and almost livid; the head suddenly heavy and oppressed; the eyes much suffused and muddy; the speech inarticulate; the tongue tre-

mulous and faltering; the gait unsteady, and speedily impracticable; the pulse small, oppressed, and feeble, or even irregular; the precordial oppression extremely intense; and the skin rather cold and clammy. Little prominent complaint, however, is made; and death may take place chiefly by encephalo-meningeal oppression within twenty-four hours, or even a shorter time; and the disease is rarely protracted to the third day.

The rapidity of the accumulative or congestive action in this form of the disease, or, to speak more to the matter of fact, the sudden stagnation and stoppage of the capillary circulation, both general and pulmonary, is the grand cause of the early fatality, and also of the absence of buboes and carbuncles, which always require some energy to be left in the capillary vessels. As the capillary vessels of all the organs are suddenly deprived of their transmissible properties, and as the motion of the blood is consequently speedily arrested in them, the vascular system of each organ is necessarily suddenly and intensely distended,—the anatomical structure of the organ is thus subjected to temporary compression,—its properties are perverted or prevented from acting, and its functions are thereby impeded, oppressed, or suspended, or even extinguished. This, which I would name the hæmastatic form (*ἁµαστασις*) of Plague, is the seventh variety of Chenot, the *pestis acutissima* of Orræus, (xxii.) and the first form of Patrick Russell, (Book ii. chap. iii.) According to Orræus, rudiments of buboes are found in the shape of hardness of the glands, and the incumbent skin being of a livid colour.

2. It appears, further, that, if the distemper do not attack thus suddenly and violently, and proceed thus rapidly to its termination, the initial symptoms are followed by a hot stage, during which the face is flushed, the eyes suffused, glaring, and sparkling, the skin hot, the pulse full and throbbing, the thirst is intense, and either delirium or stupor, or even coma, ensues. This assemblage of symptoms is followed by some remission, during which delirium subsides, the face is less flushed, and the pulse is less full. In a few hours, however, the eyes become muddy, the countenance is confused and bloated, epigastric oppression, and burning pain at the pit of the stomach, with incessant restlessness, ensue; vomiting or diarrhœa takes place; the pulse becomes small, oppressed, and fluttering; speech becomes indistinct and inarticulate, and the tongue tremulous. At the same time, that is, the evening of the second day, buboes appear in the groin or axilla, and even carbuncles and

stripes may occasionally appear. But the powers of the vascular system are already extinct, and death takes place before the former are matured, or the carbuncular spots have time to excite inflammation. This is the sixth or *acutior pestis* of Chenot, the third variety, *pestis acuta*, of Orræus, and the second and third forms of Patrick Russell.

3. It appears that in a large proportion of cases of plague, along with the symptoms of febrile disorder, buboes and carbuncles appear on the first day, or at least early on the second; and that though the assemblage of symptoms varies both in concurrence and in the order of their succession, the prominent characters are remissions during the day, accessions and exacerbations in the evening, and a tendency to sweating in the morning, with the more or less uniform progress of the buboes to suppuration, and the carbuncles to ulceration and ejection or decision of the mortified sloughs. In some instances the morning sweating of the third day is critical, in others that of the fifth, and in some that of the seventh. In some, however, the disease terminates fatally on the fourth, the seventh, or the eleventh day. In general, about one-half of those attacked recover from this variety of plague. The fatal event is generally preceded by extreme jactitation and restlessness, *delirium*, *syncope*, profuse fetid, almost dysenteric discharges, petechial spots, and blue or black stripes, and convulsions. This form of Plague accords with the fourth class of Chicoyneau, and the physicians of Montpellier, the fourth and fifth of Chenot, the *pestis acuta* of Orræus, and the fourth form of Patrick Russell.

4. In almost every plague epidemic, and most places where the disease is prevalent, sporadically and indigenously, instances frequently occur in which the febrile symptoms are so mild and advance so slowly, that the distemper, though attended with its usual symptoms, may proceed beyond the seventh day, and in some instances it may be protracted to the fourteenth. The disease then evinces various oscillations in the febrile process, in the gastro-enteric organs, in the secretions, and in the progress of the cutaneous and glandular affections. The leading or prominent character of the disease is, that the perversion of the action of the capillary system is less intense, and consequently less completely overpowers and oppresses the different organs, and less perfectly impairs their functions. It hence results, that in such cases the symptoms of general indisposi-

tion are slight and transient, and often do not interfere with the usual occupations of patients. The symptoms then are mere squeamishness and want of appetite, listlessness, and incapacity for much exertion, thirst, general heat, especially during the night, and interrupting sound sleep, and quickness and throbbing of the pulse, all becoming much abated about the morning of the third day. But this form never presents the bloated, turgid, stiffened countenance, the suffused, glaring, or muddy eye, the confused drunken stare, the small oppressed pulse, or the agonizing epigastric constriction, or the devouring sense of burning at the heart, by which the other forms are distinguished.

Glandular swellings or carbuncles, or both, appear about the first, second, or third day. The former proceed regularly and uniformly to suppuration, and sometimes cause much inconvenience to the patient by their size impeding the motion of the limbs, and preventing him from walking, which he can easily do, so far as the febrile disorder is concerned. The carbuncles quickly form black sloughs and crusts, which then give rise to healthy and vigorous suppuration, and are thus detached.

In general all the cases of this form of plague recover, unless under very bad management, or the occurrence of accidents and unexpected contingencies.

It corresponds to the fifth class of Chicoyneau and the physicians of Montpellier, the first and second forms mentioned by Chenot, the *lenta pestis* of Orræus, and the fifth and sixth class of Patrick Russell.

To complete this semeiographical sketch of plague, it is necessary to give some account of the glandular and cutaneous affections incident to that disease. This will include not only the buboes and carbuncles, but the *stigmata*, petechial spots, blue or black patches (*maculæ magnæ*,) and stripes (*vibices*,) and the general livid discoloration of the surface.

Though buboes in plague may appear either in the inguinal, the axillary, the parotid, the submaxillary, or the cervical glands, they are most frequent in the first situation.

The inguinal pestilential Bubo most usually appears in the inferior order of the lymphatic glands; and its formation is indicated by a burning, shooting pain felt in the part, before swelling can be recognized. In the course, however, of 18 or 20 hours, *i. e.* on the evening of the first day, a small hard round

or ovoidal tumour is felt by the finger, more or less deeply seated, but generally moveable beneath the skin, which is still soft, natural in colour, and scarcely protuberant. During the first week it continues slowly to proceed with pain and tension, but with little discoloration of the skin; and external redness with suppurative softening seldom takes place till the fever abates and is declining, or sooner than the 8th or 9th day. In such cases, suppuration proceeds, and a spontaneous opening takes place between the 15th and 22d days.

In some cases, however, in which the process of glandular inflammation does not proceed uniformly, but undergoes various oscillations and fluctuations, the spontaneous disruption of the bubo is retarded 8 or 10 days longer.

In other instances, also, the process of inflammation may stop without proceeding to suppuration, and, under the influence of profuse critical sweating, the bubo may be entirely dispersed by absorption.

In a third class of cases, in which suppuration does not take place, the tumour remains for months very hard, but void of pain or superficial redness, and has been erroneously supposed to be of a scirrhus nature.

In some instances, small hard glandular tumours appear beneath the skin of the head, throat, shoulder, the vicinity of the collar-bone, on the neck, over the *scapulae*, on the back, side, breast, belly, and over the extremities. These tumours, which are less painful than the inguinal or axillary lymphatic bubo, are denominated by Russell *spurious buboes*. They do not appear before the second or third day; and about the sixth or eighth day the skin begins to redden, and the swelling to become soft, after which they give way spontaneously. They do not appear to be seated in genuine lymphatic glands. Originally observed by Zacutus Lusitanus, they were seen not only by Russell, but by Chenot in the Dacian plague of 1756, and De Mertens in the plague of Moscow in 1771.

Parotid buboes are most common in children and young persons, generally swell rapidly to a great size, but suppurate slowly and imperfectly. In some instances this suppuration perpetrates baneful ravages among the cellular tissue and muscles even, and exposes vessels, nerves, and tendons. (*Traité de la Peste de Marseille*, p. 36. Paris, 1744.)

The Carbuncle assumes so great a variety of characters in

Plague, that some observers have described several different sorts. Thus Bertrand describes two, the carbuncle and the carbuncular or pestilential pustule. Geoffroy distinguishes the carbuncle from the *anthrax*, and enumerates three varieties of the former, 1. the red, with a black central part; 2. the citron-coloured; and 3. the pestilential pustule,—and represents the *anthrax* as the malignant or mortified form of the carbuncle. De Mertens, in imitation of the ancients, distinguishes the *anthrax* from the carbuncle, as a part mortified directly without previous inflammation. Orræus describes two varieties, the humid and the dry; and Patrick Russell enumerates not fewer than five different forms of its appearance.

Many of these distinctions appear to depend on the stage of the process at which the carbuncle is seen; and several of them certainly seem referable to the rapidity or tardiness of the pestiferous action on the skin. On this account, the view of Orræus appears to approach most nearly to the correct one.

All the varieties of carbuncle, I think, may be traced to two different modes of operation of the pestiferous material, whatever that be, on the skin. Either the corion is smitten all at once by the pestilential action in a form so concentrated and intense, as to kill immediately the spot or spots, exactly as if a live coal, a hot iron, or a portion of caustic potass, had been applied;—or it is injured with sufficient intensity to produce at the point or points violent inflammation, passing rapidly to gangrene, but not so violently as to produce immediate death. In the first instance a dark-gray or black-coloured hard spot, generally circumscribed, and speedily surrounded by a red, crimson, purple, or violet ring, or *areola*, is formed. In the second case, the local inflammation appears in the shape of a red, burning, fiery spot, in which the cuticle is first elevated in the shape of a whitish-gray or ash-coloured but flat vesicle, beneath which the corion is found covered with dark serous or sero-sanguine fluid, and with a central point completely hard, gray or black, and dead,—or in that of a pimple or pustule, more prominent and acuminated, and with the apex yellow at first, and the marginal basis of a bright crimson red, inclining to brown, and hard and swelled. Of this latter form, the *apex* becomes brownish-gray or black, on the second, or at most on the third day; and in both cases, when the eschar or slough is thus established, they nearly resemble the first form.

The first form of carbuncle corresponds to the *anthrax* of the

ancients, of Geoffroy and De Mertens, and the dry carbuncle (*Carbunculus siccus*) of Orræus. The second corresponds to the *Carbunculus* of the ancients, of Geoffroy and De Mertens, and the moist carbuncle (*Carbunculus humidus*) of Orræus. (*Descriptio Pestis, Experient.* xviii. p. 96. *Petrop.* 1784.) As the first form seems to differ from the second chiefly in the greater intensity of the mortifying cause, it is reasonable to infer that their predominance indicates a malignant form of the disease. In both cases, after the eschar is completed, it gives rise to secondary inflammation and suppuration; and the energy of this process depends on the energy of the capillary vessels and organs of the patient.

Carbuncles may appear on any part of the person, and may even occupy skin covering a bubo. (Chenot and De Mertens.)

According to Alexander Russell, they are most common in muscular and tendinous parts. The inflammatory, vesicular, pustular, or moist carbuncle, however, is most usual on the neck, cheeks, breast, back and extremities; whereas the *Anthrax* or Escharotic Carbuncle is most usual on the neck or back.

Carbuncles appear sometimes on the first, chiefly on the second day, or on the third, and occasionally in successive crops. Russell never saw them appear after the 18th day. Their number varies. Of the anthracoid or escharotic carbuncle, in general, only one or two appear in the same individual. But the vesicular or pustular may appear in greater numbers,—varying from six to ten, or even twenty. They do not appear to have been very frequent in the Egyptian plague of 1798 and 1799.

The size of the pestilential carbuncle varies from that of a split pea, or a silver penny, to that of a shilling or half a-crown, some of them attaining the diameter of an inch and a-half or two inches, and in a few rare cases even three inches, and penetrating from the skin to the cellular tissue, and even the muscles. The Marseillaise physicians state also that they found carbuncles in their inspections in the centre of muscles, for instance the pectoral.

In some instances the skin presents ordinary pustules not much dissimilar to those of small-pox, which do not mortify, but undergo a process of healthy suppuration, with a red but not livid or black *areola*; and these terminate spontaneously, by the matter becoming thick and drying, and forming a crust which eventually drops off. (A. Russell). The occurrence of such pustules in plague epidemics shows the modification of

pestiferous action in different subjects, under different circumstances.

Boils or furuncles are sometimes observed in plague.

The appearance of *stigmata* and petechial spots is not uniform in plague. In the Halebeen epidemic of 1743, confluent petechiæ, interspersed with livid pustules, appeared on the bodies of those cut off by the first or Hemastatic form of plague, instead of the buboes and carbuncles; and the same fact was recognized by Chenot in the Dacian plague. In the Halebeen epidemics of 1760–1761, and 1762, Dr Patrick Russell observed them occasionally in the form of red, purple, or dusky brown spots, like flea-bites, which assumed a livid colour before death. In this state, especially if confluent, they seem to constitute one variety of what the older physicians have denominated death-spots. (*Maculæ Mortis*.)

In the descriptions of the diagnostic marks of plague, as it occurred in London in 1636 and 1665, frequent mention is made of Tokens; and it appears from the descriptions of Kephale, Thompson and others, that this name was chiefly applied to dark-red or livid *stigmata*, *petechiæ*, and *maculæ*.

Dark-red petechial spots were observed in the plague of Marseilles by Chicoyneau and the Montpellier physicians, by Chenot in the Dacian epidemic of 1755 and 1756, in the Moscow epidemic by De Mertens and Orræus, and in the Egyptian pestilence by Desgenettes, Larrey, Savaresi, Pugnet, and As-salini.

In pestilential cases the appearance of petechiæ is generally attended with that of dark-red, purple, blue or black patches (*maculæ*,) or stripes (*vibices*,) irregular in shape and size, on various parts of the body, in which the circulation is either languid, or pressure is most constant.

Upon the whole, it results from observations made in different pestilential epidemics, that dark-red, or purple, or black *petechiæ* and *vibices* appear in general in the first or hemastatic form of plague, when neither buboes nor carbuncles are developed, and that in this form of plague they are extremely inauspicious symptoms, and invariably evince the virulent character of the disease. It appears further, that petechial spots and stripes may in the other forms of the disease, but especially the second, appear about the fourth or fifth days, and then betoken the virulent character of the distemper; and that in all

circumstances, when they become quickly purple, livid, blue or black, they indicate in general a speedy fatal termination.

Conversely, when numerous minute *stigmata*, or lenticular points, like millet-seed eruption, very closely set, appear about the fourth, the seventh, or the ninth day, or even afterwards, though they be attended with a little anxiety, if the other symptoms do not deteriorate, these spots may continue red, and, gradually fading in colour, insensibly disappear. Petechial spots of this character indicate no excessive degree of virulence, and recovery generally takes place, notwithstanding their appearance. The same favourable opinion may be entertained of spots (*maculae*,) which, though large, are uniform in colour, red or purple, which generally cover the arms, chest, thighs or feet, and which are associated with buboes and carbuncles, and the miliary *petechiae*.

Lastly, it is very common for the purple stripes or patches to coalesce so much immediately before death, or about the time of that event, that large portions of the corpse are marbled or chequered of a livid, purple, or even blue and black colour, interspersed with red and green; and after respiration and pulsation ceases, but while the body is still warm, the whole skin of the thighs, belly, back, and shoulders may become speedily livid or black.

§. II.—PATHOLOGY.—I have now to consider the state of the different tissues and their vessels in plague, in order to illustrate its pathology; and to render the observations now to be submitted intelligible, I have to premise some remarks on the morbid anatomy of persons cut off by Plague.

It is chiefly to the courage and diligence of MM. Chicoyneau, Verny, Soullier, and Deidier, during the pestilential epidemic of Provence, and especially Marseilles in 1720 and 1721, that we are indebted for any information on the subject of the state of the different organs after death by plague. The inspections and observations of these authors furnished the following results as their appearances.

In the first class all the organs of the chest and belly were livid, of a deep red, or blackish colour; their vessels were filled and turgid with dark-coloured blood. An infinite multitude of vessels, which in the natural state are almost or wholly invisible, became so obvious in the investments of the lungs, the *pericardium*, the stomach, and the intestines, that their smallest

ramifications might be traced. The interior of the head was not inspected.

In the second class, in which the brain was inspected, the vessels of the brain and its investments, of its surface, of its substance, white and gray, and the sinuses, and even the carotid arteries were much distended with thick dark-coloured blood.

The lungs were of a deep black or livid colour, their vessels much distended with thick dark-coloured blood, and their substance softened,—in some instances chequered by livid stripes or patches, generally swelled or enlarged, so as to protrude the heart, and project occasionally from the chest. The heart was in all cases much enlarged, and its chambers were filled with dark-coloured grumous or half-coagulated blood.

The liver was in general enlarged, often marked by dark, livid, or purple spots and stripes, and its vessels were distended with much dark-coloured blood. The gall-bladder, and even often the stomach and bowels were filled with greenish or dark-green bile,—in short, similar to that rejected by vomiting and discharged by stool.

In many instances dark-red, purple, or violet-coloured spots, patches, or stripes were found in the stomach and various parts of the intestinal tube, and even the *peritoneum* and *omentum*. The inguinal and axillary glands were enlarged, livid, and in general loaded with dark-coloured blood; and in many also, dark-coloured masses of definite shape, which were therefore named carbuncles, were recognized; and carbuncular pustules were also found in the lungs, the liver, the stomach, the intestines or the spleen.

Though the blood was always found in the arteries and several of the veins, dark-coloured thick and semi-coagulated, yet in various other parts it was preternaturally fluid, and did not undergo coagulation. Thus not only did the buboes, upon being divided, emit from their smallest vessels discharges of bright-red fluid, very dissolved blood, which it was impossible to stop, but the viscera, the vessels of which were most turgid, discharged on being opened a species of blood very much dissolved, or, in more accurate language, with its fibrin disorganized.

Connected with this state of the blood in the dead subject is the disorganized condition of that fluid in the living body after the symptoms of plague have continued for some time. Blood drawn either in the first form of cases, or in the others

after the first or second day, is very generally a dark-coloured, viscid, semifluid substance, not springing out like healthy blood, but trickling slowly like muddy wine lees, or even treacle, (*Traité de La Peste*, Paris, 1744),—a change which only takes place in consequence of stagnation of the blood in the vessels, and the influence of the air and respiration having ceased to operate on it. This change consists not in putrefaction, as was believed by the elder pathologists, but in the fibrin of the blood losing its tenacity or cohesion, and power of spontaneous coagulation, and thereby becoming separated into numerous minute atoms or particles. It hence neither retains its fluidity, nor coagulates in a healthy manner.

These facts, which have been confirmed by the inspections of Larrey and Pugnet, combined with the symptoms, I would apply to explain the pathology of plague in the following manner.

Whether the remote material cause of plague be a poison or not, it may be justly inferred, that it acts on the whole system of the capillary vessels of every tissue and every organ of the human body, either upon the tissue of which these vessels consist, or upon their contents, or upon both simultaneously. Its effect is either to render these vessels unable to transmit their contents, or to render their contents incapable of being transmitted, and, in short, to produce a sudden, almost immediate retardation of the motion of the blood, in the capillaries of all the organs, in all cases of plague, and in the most intense and virulent, stagnation more or less complete of the blood.

That this is the fact is to be inferred from the four following circumstances: *1st*, that the arteries of the brain and its investments, of the stomach, of the intestinal tube, and of the secreting glands, are distended with dark-coloured semifluid blood; *2d*, because the vessels of all the organs are much loaded with dark-coloured fluid blood, which escapes immediately upon the smallest incisions; *3dly*, because in several of the organs, for instance the brain, the lungs, the liver, the kidneys, and other solid organs, nay even the muscles, dark-coloured half-coagulated blood is found fixed in clusters of vessels, so as to form dark or carbonaceous patches and masses; and *4thly*, because dark-coloured grumous blood is found not only in the right chambers of the heart, but in the left auricle and ventricle, in which they are not usually found in ordinary death.

These circumstances prove that the blood has been sudden-

ly prevented from moving through the capillaries from the arterial to the venous side of the vascular system, and has thereby not only been accumulated in the arterial side, but had, during its stagnation there, acquired the dark colour and other qualities of which it could be relieved only by passing again through the pulmonary artery. The result of this is, that while the capillaries and their arterial division are overloaded and distended with dark-coloured blood, the veins necessarily receive less than their normal quantity, and these vessels, consequently, are comparatively empty and flaccid. The first circumstance, the arterial fulness, in reference to the brain, is the cause of the distension and weight of the head, the turgid bloated appearance of the features, the suffusion of the eyes, and the confused drunken look, together with the stammering indistinct speech, the faltering tremulous tongue, and the feeble, unsteady, and tottering gait. The second circumstance, viz. the venous exhaustion and flaccidity, is the cause of the faintness and the swooning, with the inability to retain the erect posture; while the unequal pressure or support given to the brain, that on the arterial side being unnaturally great, and that on the venous side being unusually small, is the cause of the delirium, *typhomania*, stupor, and coma.

The same sudden stagnation of the blood in the gastro-splenic and gastro-enteric capillaries, with the consequent distension of the arteries, gives rise to the epigastric weight, oppression, and squeamishness, with occasional vomiting and the sense of internal burning, which are so constant symptoms of pestilential attacks; and this, with the state of the pulmonary circulation, presently to be noticed, contributes to cause the anxiety and weight referred partly to the heart, partly to the site of the diaphragm.

A similar and simultaneous state of the pulmonary circulation aggravates this capillary disorder, by preventing the blood from being transmitted from the pulmonary artery to the pulmonary veins, and consequently, not only preventing the blood from being duly aerated, but preventing it from being circulated, from the venous to the arterial system. It is from this circumstance that the lungs appear so much blackened, and that their vessels so generally contain in plague only a mass of dark semifluid dissolved blood.

In short, I think it inevitably results from the anatomical

facts and the symptoms of the distemper, that in plague the capillary system of the whole frame is suddenly smitten by a species of atony or loss of power of transmission, and that a consequent stagnation of blood and all its consequences ensue.

When this is intense and irreparable, it kills immediately, or at least within a few hours, or a day at most; and the phenomena of dissolution are precisely those of death by general *hæmastasis*. If it be either not sufficiently intense to induce immediate death, or if the capillary vessels of the organs of the individual possess sufficient energy to resist this species of sudden *inertia* or suspended vitality, it is only at the expense of death taking place in certain points of the skin, and suppurative disorganization in the lymphatic glands. The sacrifice of certain parts appears to be then necessary, to save the vital organs and the whole frame which depends on the integrity of these organs. In the Dacian plague of 1755, Chenot observed that no one recovered in whom glandular swellings did not take place.

§. III.—ETIOLOGY.—The origin of Plague is involved in obscurity, and the circumstances on which its propagation depend are very imperfectly known.

Genuine Glandular and Carbuncular Plague appears not to have been known to the ancients; and the first notice of its appearance is given by Procopius and Evagrius in the middle of the sixth century, when it is said to have spread from Constantinople over the greater part of the habitable globe. Since that time it has been known to prevail more or less frequently in the towns along the coasts of the Levant and the Mediterranean, and has occasionally made its appearance in different countries of Europe.

It appears from the testimony of the best authors, that plague is never absolutely extinct in Smyrna and Constantinople, and that, though years may elapse in which no general or comprehensive epidemic occurs, insulated or sporadic cases take place at intervals more or less remote in these towns, and perhaps in others along the coasts of Asia Minor and Egypt. There is reason, therefore, to believe, that, upon whatever causes the existence of plague, either in its sporadic or epidemic form, depends, these causes are in more or less constant operation in the Levant, and that the disease is indigenous to the towns situate in that region of the globe.

It is, nevertheless, a singular fact, that whenever any considerable number of cases appears in Cairo or Alexandria, the Egyptians invariably ascribe them to introduction from Barbary, Syria, or Greece; and conversely, when it appears in Tunis, Aleppo, Smyrna, or Constantinople, the inhabitants allege that it has been imported from Cairo or Alexandria, or some other Egyptian port.

Of this fancy of tracing epidemic mortal distempers to remote regions, in which it is impracticable to obtain direct evidence of the accuracy of the statement, the original author was Thucydides, who gave historical importance to the current popular report, which represented the Athenian plague to have issued from Ethiopia, and to have descended successively to Egypt, Lybia, Persia, and the Athenian territory, (*B.C.* ii. *μη.*) That the statement thus sanctioned by a classical model of history should be adopted by Lucretius (*vi.* 1139,) is not at all wonderful, when we remember the servility with which even the most distinguished Roman writers have copied their Grecian predecessors. But it is rather singular that Mead should, with a less excusable degree of servility, have adopted the whole of this fancy without hesitation or inquiry, and can be only explained by the admission, that his habitual deference to the ancient classics had made him overlook the fact, that, however eminent as poets and historians, their authority as medical observers could not give any supposition the strength of an ascertained fact. The statement, indeed, that the plague had at any time issued from Ethiopia, is completely gratuitous and imaginary. Neither in the soil, the climate, or the atmosphere of Ethiopia, can there be any thing which is not found in those of Egypt, Syria, Asia Minor, and Greece, which could be more favourable to the production of the plague in the one country than in the others; and it is a historical fact, that neither the Portuguese travellers, in their frequent journies into Abyssinia during the 14th and 15th centuries, mention the distemper, nor did Bruce recognize its existence in the end of the last century.

There is, on the contrary, the strongest reason to believe that Plague is the indigenous product of the towns on the coasts of the Levant, in which it so habitually prevails, and that the geographical and topographical position, and the physical characters of the climate, concur with the habits of the natives to

engender this distemper from time to time. That this is the case, may be inferred from the fact, that no distemper similar to plague has been known to be indigenous to the other countries of the globe,—that plague has never been known to originate either in the East Indies or on the continent of America, and that, when it has arisen in any European city or town, it has previously been known to prevail in some port or city of the Levant.

Unless, indeed, we admit the spontaneous growth of plague in Egypt, Syria, Asia Minor, and Greece, it is impossible to account for the sporadic cases which occasionally occur in the towns of these countries, or the origin of new epidemics, since, after the termination of an epidemic attack, the contagious principle, admitting its existence, must either have become extinct, or at least inert, which is the same thing, so far as the question of propagation is concerned.

Aware of the arguments now mentioned, Chicoyneau and his coadjutors maintained that plague was produced by an unhealthy state of the air, and was void of contagion; and Arbuthnot (1751) was inclined to believe that plague is either indigenous to certain places in the Levant, or may be produced in them by certain changes in the state of the atmosphere. Soon after, a more distinct and decided view was given by Dale Ingram, who in 1754 not only maintained, from a very extensive and accurate survey of the epidemic plagues, by which the globe had been ravaged, that it was endemial in the Levant, but contended with great force of argument, that distemperature of the atmosphere, climatic peculiarities, and especially the long continuance of south winds, concurring with geographical and topographical position, are always adequate to engender, and did engender, plague; and, without absolutely denying the existence of contagion, he taught, however, that the disorder could not be communicated in goods or clothing to this country, and never arose in it without a concurrent indisposition or infected state of the atmosphere. (Historical Account, chap. ii. and vi.)—Chenot, in like manner, observing that while it occasionally ravaged Egypt, Syria, the Archipelago, and Thrace, it scarcely touched the contiguous regions; and that in Europe it becomes extinct spontaneously, and does not reappear, unless when introduced from the East, infers that it arises spontaneously in the former situations, and acquires contagious properties, by which it is afterwards pro-

pagated. Thirdly, Stoll of Vienna, in 1777, expressed his doubts of the contagious character of Plague, considered it merely an intense form of malignant fever, and maintained its spontaneous origin. (*Rat. Medend.* ii. 63.)—Fourthly, Martin Lange of Brasow, in Transylvania, which plague had visited in 1709, 1718, 1738, 1756, and 1760, in a short view of the history and characters of the distemper, denies that its only native soil is Egypt and Ethiopia, maintains that plague arises in Europe independent of contagion, and asserts that every large city in Asia Minor and Egypt, as Constantinople, Smyrna, Adrianople, Alexandria, &c. always possesses in abundance the generating causes of plague. (*Rudimenta Doctrinæ de Peste, Viennæ*, 1784, § 5.)

On the same grounds principally, Desgenettes, Savaresi, Larrey, and Assalini, conceive that the towns of Syria and Egypt possess, in the habits of their inhabitants, the efficient productive causes of glandular and carbuncular plague. Larrey, in particular, observes, that it is difficult to resist the inference, that this distemper may be engendered in these towns, when we reflect on their construction, with narrow, tortuous, unpaved streets,—with houses imperfectly ventilated, and filled with garbage, each street forming receptacles of filth, where the rain water during winter putrifies, especially in the maritime towns, by reason of the disposition of the soil of these towns, the centre of which is always below the level of their circumference, and even of that of the sea or surrounding lakes, or marshy rice-fields.

He further adds, in confirmation of a remark made by numerous authors, that the plague is invariably most frequent and most intense during the prevalence of south winds (the Khamsin) which continue to the end of May, and favour, by their humid suffocating heat, the decomposition of dead animal or vegetable matters; that the inhabitants are inattentive not only to cleanliness in their houses, clothing, and persons, but to ventilation; that their food is often very bad and innutritive; that they are indolent and inactive; and that they often allow the carcases of animals, especially dogs, to rot in heaps in their courts and alleys.

It is, indeed, well known that the plague prevails in Egypt chiefly, if not solely, in the spring and early part of summer, between the months of February and June; that it generally disappears at St John's day (24th,) as the *Nycta* or Nile-dew descends

and the river begins to rise ; and that it does not recur till the month of February.

In Constantinople, also, it is observed that it prevails principally in the suburb denominated the Seven Towers, which are most densely inhabited by an indigent population, very inattentive to personal cleanliness, and about this district it appears either to arise spontaneously, or never to become fully extinct. At Aleppo, Russell assures us that it is always imported either from Damascus, or some part of Egypt, and that when it ceases there, it ceases totally and entirely, and no sporadic cases occur.

But though plague appears thus in insulated and sporadic cases frequently in the towns of Egypt, Syria, and Asia Minor, it assumes at certain intervals a much more general and comprehensive character, and evinces a more virulent and fatal disposition. These epidemic predominances of the disease were early remarked to observe a periodical course ; and Evagrius represents the plague to have appeared in Antioch about the second year of each indiction, that is, about once in each period of fifteen years. Egypt it is said to visit every fifth year ; and it is a popular belief at Aleppo, that it returns every tenth or twelfth year. Though this inference accords with fact as to 1719 and 1729, and even as to 1733, and 1743, and 1744, it does not in the case of the plague of 1733, which recurred after an interval of only six years ; nor in that of 1760, 1761.

It is well ascertained, however, that in certain seasons it assumes a very comprehensive and diffused character ; and these events have been very generally ascribed to the concurrence of two causes, the introduction of a principle from the persons or clothings of persons already labouring under plague, and to which poisonous properties are ascribed, and the existence of a certain state of the atmosphere, which is conceived to be favourable to the diffusion of this poisonous principle among the population of a dense community, in which personal and domestic cleanliness and ventilation are neglected.

The grounds on which the existence of a contagious principle in plague is inferred, are the transmission of the disease from the sick to the sound, nearly in the proportion of the exposure of the latter to the persons and clothing of the former ; the transmission of the disease by means of articles of clothing, as furs, cloaks, shawls, &c. ; the probable transmission of the

disease by means of the furs of domestic animals, as cats, &c.; the gradual diffusion of the disease in any community after the first few cases have taken place; and the immunity generally enjoyed by those who are not exposed to the persons or clothing of the infected, and where segregation and seclusion are adopted at an early period of the epidemic. The immunity enjoyed by the Orphan Hospital of Moscow in the plague of 1770, was an excellent example of this principle; and that of the town of Isola, in the Maltese plague of 1813, is another.

The facts and arguments which have been conceived adequate to justify the denial of the principle of contagion in the glandular plague of the East, and to demonstrate the influence of a pestiferous state of the atmosphere, are the following: 1st, The circumstance of the spontaneous origin of the plague in various places of the Levant, as already stated. 2d, The fact, that, though upon its appearance in any given place, it was reported to have been introduced in the persons of human beings or various articles of commerce from another place, in which it was represented to be prevalent, it had either not been shown to have been introduced into that city or town, but must have arisen spontaneously, or no clear communication was demonstrated to have taken place. When the plague prevailed in the French army in the expedition to Egypt during 1798–99, and was represented to have been introduced from Constantinople, it was a fact established by the united testimony of Desgenettes, Larrey, Savaresi, Pugnet, Pouqueville, and indeed every observer of any note, that all communication was cut off between Constantinople and Egypt. 3d, The circumstance that, when it has appeared in a commercial city after the arrival of vessels and persons from suspected or actually pestiferous ports, the first cases have appeared not in the district nearest the wharves, but in a locality more remote. Thus it was asserted, that when the plague of 1665 appeared in London, it was imported from Holland; but it is answered, in opposition to this, that several cases of plague had appeared in Westminster in the winter of 1664, six months previous to the general eruption of the distemper. (Dale Ingram, chap. iii. Webster, vol. i. p. 316.) 4th, The alleged occasional inefficiency of the strictest system of quarantine restrictions. Instances of the inefficacy of the system of segregation are recorded by Sennert, Diemerbroeck, the Montpellier physicians, in the case of the epidemic of Marseilles, Pye, and others.

5th, The origin of pestilential epidemics in different towns at the same time nearly without regard to mutual intercourse or communication. 6th, The rapid diffusion of the disease in a dense population in directions and among individuals in which no intercourse or communication can be traced. 7th, Because, after plague has subsided epidemically in any place, the apparel of pestiferous patients were worn, their beds were used, and their abodes were inhabited, as freely and unscrupulously as before the appearance of the epidemic, and yet without giving rise to the disease.—(Hodge, Diemerbroeck, Chicoyneau, Soame, Dale Ingram, &c.) 8th, Because one attack of plague does not secure against a second.—(Chicoyneau, Chenot, Alexander Russell, Orræus, Larrey, Assalini, &c.) 9th, The disappearance of birds from places immediately before the appearance of plague epidemics, and the death of those confined in cages, and which consequently were unable to take flight; and the occasional prevalence of epizootic diseases among horses, cattle, and domestic animals generally, previous to the appearance of pestilence among human beings. 10th, The circumstance that many persons, though very freely exposed to the sick, do not contract the disease. Thus numerous examples are mentioned by Diemerbroeck, Chenot, Russell, Larrey, and Assalini, in which the freest exposure was not followed by any attack of the disease; and infants at the breast are repeatedly represented to have escaped, though their mothers or nurses were sick or dying of the disease. 11th, The circumstance that in most plague epidemics the disease has continued a certain time, has not become moderate or been extinguished by the adoption of any prophylactic or restrictive measures, and has at length spontaneously subsided. This is believed to be confirmed by the history of the plague of Marseilles and Provence generally, in 1721, 1722, and is admitted even by Patrick Russell.

Admitting these facts to be accurately ascertained, and the arguments to be justly deduced, the only mode in which they appear to be capable of being reconciled, is, by supposing that glandular plague is originally engendered in the Levant, under certain concurrent circumstances of weather, season, physical peculiarities, and modes or usages observed by the inhabitants; that though originally generated in this manner, and therefore not dependent on an inherent or constant contagious principle, it speedily acquires such a property, and may be thereby dif-

fused and propagated in proportion to the density of the population, and the conducting state of the atmosphere; and that, though, by virtue of the same contagious principle the distemper may be conveyed to a considerable distance in *fomites*, or the persons of human beings, it requires for its efficient propagation a concurrent state of the atmosphere, and a population more or less dense, more or less inattentive to cleanliness, and more or less addicted to gross feeding and errors in diet.

It appears, therefore, that in the production and propagation of pestilential epidemics two circumstances concur; the contagious principle, elaborated by the distempered body, or contagion simply, and the state of the atmosphere. To distinguish the latter circumstance from the former, Mr Dale Ingram first proposed in 1754, to employ the term Infection; and while he denied the contagious property of the glandular plague, he admitted the infecting power of the atmosphere. This distinction has been revived in modern times by many who are either ignorant of its author, or erroneously ascribe the distinction to others who have no title to it.

Admitting the existence of a contagious principle in plague, it does not appear that it spreads far from the source of the alleged poison. It is found that in general, if direct contact and inhaling the breath of patients be avoided, they may be approached with impunity. In short, it seems doubtful whether mere contact be adequate to communicate the disease, without inhalation of the breath of pestiferous patients, or long exposure to the atmosphere in which they are placed.—(Russell, Orræus, Desgenettes, Larrey, Pugnet.)

It has not been determined in what particular secretion or excretion of pestiferous patients the contaminating principle resides. Popular apprehension concurring with professional opinion, has often looked on the matter of buboes and carbuncles as capable of communicating the disease. But it seems very doubtful whether the matter of these ominous objects contain any thing specific; and while, on the one hand, it is certain that in the towns of the East they are daily dressed by healthy persons without injury; and persons recovering from plague with open buboes and carbuncles are allowed with impunity to appear in public, and mingle in society, without seeming to communicate the disease; on the other, the matter has been occasionally inoculated without producing any bad effects. Thus

Desgenettes informs us that he applied, by a slight puncture in the groin and arm-pit, the matter of a pestilential bubo, without observing any precaution, except that of washing with soap and water, and they were followed only by two inflammatory points, lasting more than three weeks, but by no pestilential accident. Assalini also states that a native physician, who was employed in attending the sick at Jaffa, was in the habit of opening all pestilential buboes by a bistoury, and after wiping it slightly by a bit of charpee, placing it between his turban and forehead, as if he did not apprehend any contagious principle. Valli also inoculated himself with matter from a pestilential tumour, mingled with vaccine *virus*, and sustained no bad effects.

It must be observed, nevertheless, that experiments of this kind are neither satisfactory nor conclusive. Individuals thus inoculated may be insusceptible, and even if alleged glandular or carbuncular matter contained any specific *virus*, this might be expelled by the circulation and secretions, without inducing the disease. The experiment of White is equivocal.

It is further to be observed, that the contagion of plague becomes inert or feeble when the atmospheric temperature is either very high or very low; and that plague equally ceases at the approach of very warm dry weather and of unusually cold weather. In Aleppo, plague, if epidemic, abates in July and August, and though occasionally at the first approach of great atmospheric heat the number of cases is augmented, the number greatly diminishes after a few days' continuance of warm weather. In the close of August, indeed, it is represented as generally extinct in Aleppo. The disappearance of the disease in Lower Egypt is generally connected with the rise of the Nile and the descent of the tropical dew, indicating this phenomenon, (24th June.) Though plague at Aleppo is generally represented to abate during cold weather, it appears from the account of the epidemic of 1761 and 1762, that it prevailed more or less during the months of December 1761 and January and February 1762, when the weather was not only frosty, but snow occasionally fell. In Egypt, it appears that the disease generally abates in June, and disappears in July, as the Etesian or north winds begin to blow, and reappears early in February. In October 1799, however, when the Nile was descending, it reappeared at Cairo, and prevailed with great mortality among all the low wet districts (Pugnet, 201,) through December, January, February, and the succeeding months to

June 1800, when it gradually abated and became extinct, (Ibid. 210.) At the same time it prevailed in September, October, and November in Alexandria and Damietta, and among the French soldiers in March 1800, under the walls of Jaffa.

It may further be regarded as established, that, whatever be the contagious property of the living frame when under the influence of plague, the disease cannot be communicated by the dead subject. Of this inference ample experience has been afforded by various pestilential epidemics. It appears, from the account given by Benza of the Vienna plague of 1712, 1713, and 1714, that the physicians of that city fearlessly inspected the bodies of those cut off by the distemper, and that none of the individuals engaged in this duty were attacked, (*Relatio Pestis, Vindob.* 1712.) In the Marseillaise and Provençal epidemic of 1720, 1721, MM. Chicoyneau, Vernier, and Souillier, and MM. Deidier, Robert, and Rimbaud, inspected many pestiferous corpses, so as to describe their appearances accurately, and sustained no inconvenience; and it is also said that the dogs and other animals which preyed on the bodies were not infected. (*Traite de la Peste, &c.*) Thirdly, in the plague which attacked the French army in the Egyptian campaign of 1788 and 1789, Desgenettes, Larrey, and Pugnet, who inspected several of the bodies of the dead, arrived at the conclusion, that corpses were inadequate to communicate the disease, however contagious the living body might be. Lastly, some disgusting stories are recorded by Jordan and others, of sextons and bearers robbing the dead of their apparel, and even violating the persons of virgins cut off by the disease, without being attacked by plague.

These results, singular as they may seem, are in perfect accordance with physiological principles. If the disease be contagious, which there is good reason to believe it is, the contaminating principle must be elaborated by the organism only during life, and must possess its infecting power only while the organs are still possessed of vital properties. When death takes place, a series of new actions commences, and the chemical properties of the elementary principles begin to operate and subvert those which are physiological. The longer, therefore, that decomposition proceeds, and the farther it advances, the more completely must it have annihilated any vital product; and if a contagious principle has been formed during life, it must cease to be formed at death, and is most probably destroyed entirely.

These inferences are applicable to the matter of buboes and carbuncles, if they be not specific in nature.

Plague does not invariably attack all sorts of persons. The young and vigorous adult are in general its most frequent subjects, and infants and very old persons escape. Strangers are in the towns of Syria and Egypt much more frequently attacked than natives. Persons with open issues are rarely attacked; and in the Egyptian expedition, it was observed that few of the soldiers with suppurating wounds evinced pestilential symptoms.

In other respects it attacks very much as remittent and typhous fever, that is, it frequently succeeds exposure to cold, errors in diet, debauches, and any causes which induce temporary disorder of the circulation and the secretions. Conversely, it is observed that those who exercise certain filthy avocations, as chimney-sweeps, soap-manufacturers, oilmen, and tallow-chandlers, are less liable to attacks of plague than others.

§ IV. TREATMENT.—On the treatment of plague it is unnecessary to dwell much. It consists of two divisions, the prophylactic and the therapeutic.

The prophylactic comprises the use of all those measures which are believed to be adequate to prevent attacks of the disease, and its diffusion among a community. These consist in the observance of a code of regulations, the object of which is to prevent the introduction of the alleged contagious principles, either in goods or in the persons of men, reported to proceed from parts where plague is either endemial or actually prevalent. The explanation of these rules, which are known by the general name of Quarantine, (*Quarantana*; *Quarantaine*;) from the period formerly (*Quarante jours*) observed for expurgation and disinfection, belongs more to medical police than therapeutics, and would occupy a very disproportionate part of a work like the present; and for information on this subject, I refer to the works of Muratori, Patrick Russell, and Foderé.

I shall merely advert to certain means which experience has demonstrated to be useful in either diminishing the susceptibility to plague, or rendering its contagion inert in regard to persons resident in cities where the disease is prevalent.

Diligent Ablution.—Volney and others remark, that the water-bearers of Cairo are very rarely attacked by plague; and this immunity has been attributed to the property which the water is believed to possess of removing from the persons any

adherent contagious principles, and the necessity which these persons are obliged to observe of incessant washing and rubbing. It may be therefore established as a very good rule for individuals to wash the surface of the person frequently with soap and water, and in this manner not only to observe personal cleanliness, but to promote the energy of the cutaneous functions.

Frictions with Oil.—It had been observed, that one year in Egypt, in which plague cut off a million of souls, no instance of any oil-bearer being attacked was known; and the knowledge of this fact, with that of a similar appearance of immunity observed at Tunis from the same cause, had suggested to Mr George Baldwin, the English consul at Alexandria, the belief, that frictions with warm olive-oil are at once a means of cure, and an antidote to the pestilential *virus*. At his request Father Luigi of Pavia, who had for twenty-seven years superintended the Pest-Hospital at Smyrna, subjected it to trial; and he found it of all the means employed the most efficacious. In five years 250 persons subjected to this treatment recovered. As a preventative, its efficacy had been also observed in 1793, in the instance of twenty-two Venetian seamen who resided for twenty-five days with three pestiferous patients who died, while the former, who used no other precaution than frictions by means of oil, escaped,—and of three Armenian families who used the same method with the effect of securing themselves against the disease.

In consequence of these recommendations, they were tried in the French army in 1798 and 1799. But apparently the same benefit did not accrue as was expected from the reported trial. Pugnet, indeed, states that they were quite inefficient; and Carrié, who tried them when the patient was under the disease, thought that they fatigued the patient, and accelerated death. Then, indeed, they can be of no use. In the Maltese plague of 1813, they appear, from the testimony of Tully, (p. 152,) Rivarola and Hennen, (p. 522,) to have been much more beneficial. On the same principle, oiled-silk dresses are believed to be prophylactic.

Fumigations by means of vinegar have been much commended, and physicians and nurses have been instructed to breathe through a sponge which has been immersed in this fluid. The great rule should be not to inhale if possible at all when near a pestiferous case, to avoid swallowing the saliva, and to rinse the mouth well after inspection or prescription.

Various other fumigations, as those by means of the resinous and balsamic gums, have been recommended. They are chiefly useful in concealing, by the agreeable odour which they diffuse, foul or offensive smells; but as disinfecting agents they have no direct power.

The only direct disinfecting agents are chlorine and the nitrous gas, and either of these may be used in such a manner as not to incommode the respiration of patients.

The clothing and bed-clothes of patients should be immersed in cold water, and then subjected to heated air or vapour at a temperature of 212° .

Smoking tobacco is no preventative.

Of the therapeutic treatment of plague it is unnecessary to say much. Under every form of treatment the mortality varies from three-fourths to nine-tenths and thirteen-fourteenths; and medical remedies have almost no influence over the distemper.

Blood-letting has been much commended by Botallus, Massaria, Septala, La Riviere, Sydenham, and De Haen; and both Alexander and Patrick Russell admit that it is occasionally beneficial. To prove so, however, it must be employed at the very onset of the disease; for, if the evacuation be delayed till the blood becomes fixed in the capillaries, and is partially disorganized, it cannot do good, and is sure to be detrimental.

Emetics have been found, upon the whole, rather beneficial in plague, not only in unloading the stomach and duodenum and their vessels, but in relaxing the skin. Their indications are the same as in the treatment of typhous fever.

The rule now mentioned, indeed, may be applied to every remedy in Plague, so far as remedies seem to be indicated.

The chief point to keep in remembrance is, that recoveries are most generally effected under sweating, more or less copious, and that this discharge is not so much promoted by the stimulant and heating diaphoretics, as under the use of cooling diluents, sponging the surface, and keeping it clean, and by gentle laxatives.

Blisters are often extremely useful.

The treatment of the Buboës and Carbuncles must be conducted on general surgical principles. The emollient poultice, with the use of the stimulant digestive ointments, as the resinous or storax, forms the best application. Larrey used poultices of onions and squills. The Turkish practitioners open all

buboes by incision. Larrey recommends the actual cautery, or the caustic potass, when they are indolent. The carbuncles are most rationally treated by the poultice, with the balsamic or resinous ointments. In some instances, however, it may be proper to divide the mortified skin of a carbuncle by a crucial incision, in order to facilitate suppuration and ejection of the slough.

SECTION IV.—SWEATING-SICKNESS, Bacon. EPHEMERA SUDATORIA, Cail. LA SUETTE. SUDOR ANGLICUS, Friend.

The disease named the Sweating-Sickness, or the English Sweating-Distemper, (*Sudor Anglicus*, *La Suetie*,) which appeared first in England in September 1485, among the troops, it is said, of the Duke of Richmond, would probably fall to be considered in this place as a febrile disorder, with evident extreme feebleness of the capillaries generally, and those of the skin particularly. The causes also from which it sprung, viz. long previous humidity of the atmosphere, may seem to indicate a species of typhoid disorder. The extreme rapidity of its progress, on the contrary, often destroying the patient sometimes in three or four hours, generally within twenty-four; its sudden enfeebling influence, the faintings, the unquenchable thirst, the consuming heat, the incessant anxiety, its extensive prevalence, and large mortality, evince a nearer resemblance to *Cholera* than to any other known distemper. Lastly, the profuseness of the cutaneous discharge, with its occasional termination in miliary eruption, establish some affinity between it and the Miliary Fever so common at one time in Europe, in consequence of the excessive use of the heating regimen.

Upon the whole, the sweating-sickness seems to have been a distemper quite singular, and presenting little analogy with any other,—except that of cholera.

Its usual duration was from twenty-four to forty-eight hours, very rarely beyond that period. In some instances, however, it was protracted to the third, the fifth, or the seventh day, after which patients were considered out of danger.

The only treatment was to allow the cutaneous discharge to proceed of its own accord, during which the patient was kept in bed. It was accounted dangerous to suppress the sweating.

BOOK II.

INFLAMMATORY DISEASES.—INFLAMMATIONS.

OF INFLAMMATION IN GENERAL.

An Inquiry into the Present State of Medical Surgery, including the analogy betwixt External and Internal Disorders, &c. Vol. i. and ii. by Thomas Kirkland, M. D. Lond. 1786.—Observations on the Circulation of the Blood, and on the Effects of Bleeding, by John Hunt, a Member of the Corporation of Surgeons. Lond. 1787.—Of the different kinds or Species of Inflammation, and of the causes to which those differences may be ascribed, by James Carmichael Smyth, M. D. &c. Medical Communications, Vol. ii. Lond. 1790. Art. xii. p. 168.—A Treatise on the Blood, Inflammation, and Gun-shot Wounds, by the late John Hunter, to which is prefixed a Short Account of the Author's Life, by Everard Home. Lond. 1794. 4to.—Lectures on Inflammation, exhibiting a View of the General Doctrines, Pathological and Practical, of Medical Surgery, by John Thomson, M. D. &c. Edin. 1813. 8vo.—Treatise on Inflammation of the Mucous Membrane of the Bronchia, by Charles Hastings, M. D. Lond. 1820.—Observations on some of the General Principles, and on the Particular Nature and Treatment of the Different Species of Inflammation, &c. by J. H. James, Surgeon to the Devon and Exeter Hospital, &c. Lond. 1821. 8vo — 2d edit. 1832.—The Principles of Inflammation and Fever, by C. E. Lucas, M. D. Lond. 1822.

§. I.—SEMEIOGRAPHY OF INFLAMMATION IN GENERAL.—
WHEN any of the external or visible parts of the human body presents unusual redness, heat, pain, and swelling, it is said to be *inflamed*, or in a *state of inflammation*; and if this state be either considerable, or extensive, or seated in an important part, it is attended with a distinct change in the circulation and the functions connected with it, as secretion, &c. The pulse is more rapid, fuller, and stronger than natural; the skin is generally hot and dry; and more or fewer of the secretions are perverted, suppressed, or otherwise impaired.

There are, however, very few parts of the body which are accessible to sensible examination, and consequently but few in which three of the four events which I have enumerated can be observed or recognized. The sensations of the patient will announce the pain of which such parts are the seat; but it is impossible to tell whether they are red and swelled or not; and

if their temperature is greater than usual, we have no means of knowing either from the sensations of the patient, or from our own observation, or by means of instruments. These circumstances render it requisite for the practical physician to found his opinion on the existence of inflammation in many parts of the animal body, on characters which, though less certain, and liable to greater ambiguity, are, however, more easily discovered either by personal observation or the report of the patient. It is on this account that the physician, who has principally to observe and treat inflammations of internal parts, or those which are not accessible to sensible observation, has recourse, along with the local or fixed pain which the patient feels, to the influence which inflammation exercises on the functions of the part, and to the general commotion which in greater or less degree takes place in the circulation. Topical pain, lesion, suspension or interruption of a function, and quick, hard pulse, are the accessible or rational signs by which the physician is led to recognize inflammation in parts which he cannot feel or examine. Although, therefore, the use of these common signs is considerably limited in the observation of diseases which are usually treated by the physician, yet, as an accurate knowledge of them, and the modifications which they undergo, forms much of the basis of the pathology of inflammation, and as I am desirous that the semeiography be as complete as possible, it is requisite to consider these signs or phenomena individually with more attention.

The redness of an inflamed part is seen only in the skin, or in some of those points of the mucous surfaces which are accessible to inspection. It is, therefore, chiefly when the skin is inflamed either primarily or secondarily, that it becomes redder than usual, and that this redness can be employed as a sign of inflammatory action. In all the cutaneous inflammations or eruptions, therefore, redness takes place as a very uniform phenomenon, and appears in different degrees and in various forms. It also appears on the skin, in consequence of inflammation of the subcutaneous cellular tissue, the subcutaneous absorbents, and superficial veins, inflammation of subcutaneous fascia, and sometimes of subfascial cellular substance. The latter form of inflammation, however, often takes place without producing redness of the skin. In the vicinity of the joints, several different tissues are assembled together, and very intimately unit-

ed to the adherent surface of the skin. In this situation not only the subcutaneous cellular tissue and fascia, if it happen to be there, but tendons, ligaments, capsules, and synovial membranes, when inflamed, communicate a degree of redness sometimes to the skin. This, however, is not constant, and it can hardly be relied upon as a sign of inflammation of the more profound tissues.

Redness appearing in the skin from any one of these causes may vary in degree, and be either bright and intense, or dull, with shades of brown or purple, approaching to lividity. In kind it may be permanent, or at least little affected by pressure, or it may be evanescent, or completely disappearing when pressed, and not returning till some seconds after the pressure is removed. Lastly, in its configuration it may be diffuse, and terminate gradually and insensibly in the natural colour of the skin, or it may terminate abruptly, and be bounded by a distinctly circumscribed edge.

Accompanying the redness, and not easily separable from it, is the lustre of an inflamed part. In the natural state of the skin, its surface is generally covered in greater or less degree with the moisture of the cutaneous discharge. This, which in ordinary circumstances, when the body is not heated by exercise, external temperature, or stimulating substances taken into the stomach, is called the insensible perspiration, appears to be principally a watery fluid, in which is suspended a small proportion of oily or mucilaginous matter. But whatever be its nature and composition, it is certain that the skin owes to it not only the soft and moist appearance by which its healthy state is distinguished, but also the peculiar smooth glistening appearance. (*Nitor cutaneus*.) In the state of inflammation, the natural lustre of the skin may be either diminished and destroyed, or much increased in intensity. In most cutaneous inflammations, in which the redness is bounded by a distinct margin, the lustre is diminished, and the surface dull. In others, however, especially which attack the lower extremities, as in the *erythema læve* of Dr Willan, the lustre is augmented, and the whole inflamed surface is smooth and shining. This state of the skin generally indicates great dryness, and much tension or stretching of the parts.

A sense of unusual heat in an inflamed part is perhaps the most urgent and obvious to the feelings of the patient; and the

circumstance of this morbid state being denominated in almost all known languages from the prevalence of this sensation, shows distinctly the importance of this as a symptom, and the impression which it makes on the feelings of the patients. Yet it is more in the feelings than in reality that it exists; for the temperature of a part, even in a very high degree of inflammation, seldom exceeds that of the surrounding parts by two or three degrees, and is never above the temperature of the blood issuing from the left ventricle of the heart. This, we know, is generally about 98° or 100° F., but is said to rise in disease so high as 106° or even 107° . J. Hunter, who examined this subject experimentally, found that in a man in whom he produced artificially inflammation of the vaginal coat of the testicle, the temperature was raised from 92° to $98\frac{5}{4}^{\circ}$. In the extremities, the temperature of which is not at all times so great as that of the blood in the large vessels, inflammation excited naturally or artificially may show an increase of temperature to the extent of 5° or 6° ; but in parts, the temperature of which is nearly equal to that of the circulating blood, this difference is not remarked.

The trifling *actual* increase of heat in an inflamed part depends on the greater quantity of blood in the vessels of the part; the *sensible* increase of heat, which is generally much greater, depends on an increase of sensibility in the inflamed parts.

The sensation of unusual heat, however, is a very useful sign of the presence of inflammation in an external part; and it may often enable the skilful surgeon to discover the process of inflammation in tissues which do not exhibit the more obvious signs of redness and swelling. This is particularly the case in inflammation of the deep-seated tissues which form the joints.

Every part in a state of inflammation is more or less painful, and this process never continues long without being accompanied with this sensation; and, when joined with other marks, is one of the surest signs of the process of inflammation which the physician possesses. It may be acute or dull; it may be pungent, piercing, lancinating, throbbing, or gnawing; or accompanied with itching; it may be girding or constrictive; it may tearing or distensive; or it may be continued or periodic. These varieties depend either on the nature of the tissue which is inflamed, or, as sometimes may be observed, on the kind of inflammatory action. In spreading inflammation of the skin,

the pain is burning or scalding; in that of the filamentous tissue it is generally throbbing, or augmented with the arterial pulsations; in the transparent membranes it is pricking, sharp, and generally very acute; in the white fibrous system, as in the ligaments, *periosteum*, &c. it is gnawing; and in the substance of various organs, as the liver, lung, &c. it is gnawing, dull and heavy, and occasionally tensive and constrictive.

On the other hand, a part which is acutely painful, when affected with acute inflammation, may be quite free from pain when affected with chronic inflammation. In the mucous membranes it is not uncommon for inflammation, especially when chronic, to have advanced considerably before it gives rise to any uneasy sensation; and we daily meet with cases in which inflammation has gone on to suppuration in the liver, kidneys, or even in the substance of the muscles, without causing its presence to be suspected, and without even producing any thing like pain. Examples of this will be found in treating of the particular inflammations,—as chronic disease of the liver, and in lumbar abscess.

There can be little doubt that the *pain* which accompanies inflammation depends on increased sensibility of the inflamed tissue, and not, as is supposed by some, on any state of the nervous system of the part. This is proved to be the case by the fact, that tissues in which no nerves are known to exist, become exquisitely painful when inflamed, and that the pain of several inflamed tissues is not in proportion to the nervous filaments distributed to them, but to their inherent vital properties. The pain of inflammation is generally distinguished by practical authors, as being increased by pressure in whatever manner applied. If the part to which the pain is referred be remote from examination, or cannot be pressed in consequence of being covered by bony or incompressible walls, any motion which has the same effect will increase the pain. Hence the utility of making the patient cough in detecting the presence of inflammation of the brain or its membranes, or inflammation sometimes of the belly, and of making him take a full inspiration in detecting the existence of inflammation of the lungs.

It is by this increase, in consequence of pressure, that inflammatory pain is to be distinguished from pain which accompanies spasms, or pain from simple distension, which are either relieved or not affected by pressure.

Tenderness, which may be here noticed as a modification of

pain, is a morbid sensibility of the membranous coverings of a part, and indicates either inflammation in it, or in some of the subjacent tissues. It is generally referred either to some part of the skin, or of the mucous membranes. The pit of the stomach (*epigastrium*,) is tender during inflammation of the stomach, during fevers, in small-pox, and some other morbid states, in which this organ is affected with squeamishness, sickness, or vomiting. The skin over an inflamed or gouty joint, or a rheumatic muscle, is tender; in various morbid states of the mouth, throat, &c. food cannot be put into it without producing much uneasiness; and when an abscess is coming near the integuments, a sense of tenderness is almost invariable. This morbid sensation, in short, may be regarded either as a precursor of inflammatory pain, or as its companion, or its successor, after the inflammatory process has subsided.

Swelling is an enlargement of the size of any part or parts of the animal body, and varies in its characters according to the nature of the texture or organ in which it is seated, and according to the duration of the inflammatory action which it accompanies. A general account of its most usual varieties will perhaps explain its nature more clearly than a mere description of it as it occurs in one kind of disease only.

Swelling may be in point of extent diffuse or circumscribed, or marginate,—in point of form, general or pointing,—and in point of consistence, compressible or incompressible, and with or without hardness.

Diffuse Swelling, which is understood by the name, is generally found in inflammation of the membranous tissues, *e. g.* inflammation of skin, mucous membrane, fascia, capsular ligaments, and the synovial membranes of the joints. As examples, I adduce acute erysipelas as to skin,—phlegmonoid erysipelas as to fascia,—whitloe (*paronychia*,) as to tendinous sheaths, and periosteum, and various affections, acute and chronic, of the joints. Diffuse swelling is also observed in inflammation of the periosteum, pericranium, and in acute spreading gangrene, which appears to be a peculiar inflammation of the subcutaneous cellular tissue.

Of circumscribed Swelling, perhaps the purest example is seen in the common inflammatory action (*phlegmon*,) occurring in the filamentous or cellular tissue. In general, the figure of this inflammatory swelling is more or less globular, but it is always,

after some time, distinctly bounded from the sound skin, or the neighbouring parts. This circumscription and globularity is always most obvious in parts where the skin is loose, and when the inflammatory action is not beneath a fascia.

Swelling with a distinct edge or boundary is that which I have termed *marginate*. It must be distinguished from the last form of swelling by this circumstance, that its general figure may be diffuse, while its limit or extent is terminated by an abrupt and well-marked edge. This *marginate* character is indeed most commonly observed in swelling, which is diffused over a considerable extent. The best instance which can be adduced is that which is observed in acute rose (*erysipelas*,) in the *erythema marginatum* of Dr Willan, and in the state of the skin which accompanies traumatic gangrene.

General Swelling is to be distinguished from diffuse swelling by the enlargement being prominent, and at the same time diffused over a great space. Examples occur in extended inflammation of filamentous tissue, in some cases of carbuncle and whitloe, in *phlegmasia dolens*, and in Barbadoes leg, which appears to depend on effusion of coagulable lymph into the interstices of the filamentous tissue.

I have introduced Pointing Swelling as a mere variety of the Prominent Circumscribed, as occurring at a more advanced stage, and denoting the approach of the inflammatory action to the surface. Its best example is in far advanced phlegmon, in boil, &c.

The consistence of the inflammatory swelling is a point of much importance. In general it is hard in the early stage of the process, and not compressible; and the surgeon judges of the maturity or ripeness, as it is called, of a phlegmon by the degree of hardness with which its base is marked. This is most distinct in the prominent circumscribed swelling. In many instances this hardness evidently depends on coagulating lymph effused into the filamentous tissue.

As inflammation advances, the swelling in general becomes softer and more compressible, and if it be of the circumscribed form, this softness is generally first observed towards the summit.

Compressible Swelling may be elastic or inelastic.

The Compressible Elastic Swelling is commonly met with in inflammations which are accompanied with collections of fluid; which may be either α bloody, β serous, γ purulent, or δ sero-

purulent. Bloody fluid is not very frequently found in inflammatory swellings; serous, purulent, and sero-purulent are much more common. Swelling occasioned by serous fluid is found in ascites, ovarian dropsy, hydrocele, *ganglia* of various parts, and perhaps in these affections of the joints which consist in inflammation of the synovial membrane. The most obvious instance of elastic swelling dependent on purulent fluid occurs in chronic abscess (*apostema humidum vel frigidum.*) Swelling dependent on sero-purulent effusion occurs in chronic pleurisy, chronic peritoneal inflammation, and several forms of chronic inflammatory action.

The Compressible Inelastic Swelling may be α , œdematous, or β , doughy.

α . Œdematous swelling occurs in one species of Rose (*erysipelas œdematodes*); it appears also as a *sequela* of acute inflammation, and with other signs frequently attends the formation of purulent matter at a considerable depth. It depends on extravasation of serous fluid into the filamentous tissue of the affected part.

β . Doughy swelling occurs in Rose both of the face and of other parts; and, as Mr Hunter has observed, when the finger is drawn over the sound and the affected surface, the different states of these respective parts is easily recognized by the peculiar difference of sensation. It occurs also in swelling of the scrotum, whether that swelling accompanies inflammation after the usual injection in hydrocele, or arises from effusion of urine into the perinæal filamentous substance, in consequence of rupture of the posterior wall of the urethra. It depends in general on a peculiar morbid state of the corion, and in some parts on that of the filamentous tissue. In all these examples of swelling, the enlargement depends either on the greater quantity of blood in the vessels of the part, or on effusion of lymph, with some serous fluid, or on both together.

Tension or *stretching* is a condition more or less strictly confined to the skin and other membranous parts. Like swelling it is a mechanical change, consisting in the part being stretched to a much greater extent than natural, and depending on the enlargement of some subjacent part or parts.

The above enumeration of the varieties of swelling will communicate an idea of its importance as a phenomenon and symptom in the process of inflammation. These varieties, however,

are observed chiefly in inflammations of external or accessible parts. We have now to mention shortly, certain circumstances relating to swelling or enlargement considered as a process in the inflammation of internal parts, or those which are less accessible to superficial examination.

When inflammation takes place in organs contained within undilatable boundaries, the physician has no means of trusting to this as a symptom in forming an opinion; but the sensations of the patient are sometimes useful in guiding him. The skull, when firmly ossified, does not yield to the distending power of the process of inflammation, and consequently, while we observed the bones separated in water of the head in infants ere ossification is complete, we find that inflammation passes through all its stages in the adult, without producing any analogous change. Instead of this, however, the attentive observer will find that the patient complains of a sense of tightness, or girding round the head, or a sense of weight and oppression, or is sometimes completely deprived of sense and motion. In fatal cases dissection shows that the upper part of the skull (skull-cap) is almost thrust off as soon as it is sawed round, and the brain seems to push up the membranes, and to raise itself above its ordinary level, and the convexity of the convolutions is much flattened, in consequence of being pressed by the subjacent substance against the inner table of the skull.

In inflammation of the pulmonic tissue, in which there are the same obstacles to detecting enlargement, the patient complains of weight and contraction of the chest, and cannot take a full inspiration. The most decided proof, however, of the actual swelling of the lung is afforded by dissection of such cases. In the healthy state, when the chest is opened, the lung shrinks, or, in the technical phrase, collapses. In the inflamed state it does not collapse, but in many instances starts a little out of the cavity, and projects beyond the divided ribs.

In inflammation of the stomach or intestinal canal, there is generally some prominence or swelling of the belly; and in severe cases it is attended with tension or stretching of the muscles and integuments.

In chronic inflammation of the liver, the enlarged organ may always be felt beneath the margin of the right hypochondre, and its outline may sometimes be seen when the external coverings are removed and the patient made to stand erect, or bend forward.

In general, also, he complains of weight and dragging tension of the hypochondriac and epigastric regions.

Other examples of this change might be mentioned, but as it is frequently exemplified in the individual diseases, it is unnecessary to dwell more on them at present.

The phenomena which have been now enumerated, redness, heat, pain, and swelling, with their varieties, have been regarded as the local characters or signs of the process of inflammation. But they may vary in degree and in duration, according as the process is seated in one kind of organic substance or another. This has given rise to the distinction of inflammation into acute, subacute, or chronic, according as the process is transient but violent, or lasting, obstinate, and long-continued. It may likewise be remarked, that though these differences may sometimes be referred to the peculiarity of tissue, yet, in a great proportion of cases, they depend on original differences in inflammatory action.

The local signs or characters of inflammation, if slight in degree, or seated in certain tissues not very closely or intimately connected with the functions of the living body, may pass through all their stages, without giving rise to any other disturbance in the system. More frequently, however, they are attended with some degree of change in the function of circulation, and those processes which depend on it, and with some change in the functions of the part in which the inflammatory action is seated. These changes have been termed the General or Constitutional Symptoms of inflammation.

Most physicians and practical writers have studied to refer these constitutional signs to general heads, and have represented them as very nearly uniform, whatever be the part inflamed, and identical in all parts of the body. To this they have given the name of Symptomatic Fever; and in the nosological arrangements of Sauvages and Cullen, the *Synocha* or Inflammatory Fever was the individual genus to which those symptomatic motions were referred. Recent authors have in general adopted these views without much or considerable modification. Yet it must have been observed, not merely in the nosological arrangements, but in actual cases of individual inflammation, that the *Synocha* or Symptomatic Fever was by no means always present, or that it was much modified, and occasionally converted into the form termed *Typhus*. The principles on which these

distinctions are made, and the distinctions themselves, are not less absurd and unreal in theory, than they are injurious in practice; and I do not hesitate to discard them entirely, and substitute views of the general or constitutional signs of inflammation, which I conceive are at once more just and more useful to the true practice of the art of healing.

The change which is most general and uniform, in consequence of inflammation, consists in the increased number and frequency of the contractions of the heart. At the same time, these contractions are performed with a degree of vibrating force, which, when transmitted along the arterial tubes, renders their pulsations more frequent, quicker and harder, or even stronger than natural. The fulness of these pulsations, which is also frequently remarked when the system is under the influence of inflammatory fever, probably depends on an actual fulness or distension of the arterial tubes. This, however, is mere matter of opinion; and I regard it as my duty to adhere to faithful description of matters of fact and observation.

With the increase in the number, and the change in the kind of arterial pulsations, the functions of secretion are more or less altered. These changes are chiefly evinced in the state of the cutaneous and urinary secretion. The skin is generally drier and hotter than natural; and while the insensible perspiration is suppressed, the individual complains either of feelings of cold, or cold and heat alternately, or the surface is affected with partial and unnatural sweatings. In some instances of inflammation, this state of the skin and its functions may exist without increase in the frequency of the heart's contractions. It is to be regarded as one of the most constant and uniform constitutional signs, whatever be the varieties of the local action.

The urinary secretion is generally much deranged when the system is under the influence of inflammatory fever. The quantity of urine is always much diminished; it is dark, red-coloured, or cloudy and sometimes turbid, and yields a copious precipitate on addition of corrosive sublimate. It is well known that in the healthy state this fluid deposits a reddish sediment or powder; no deposition of this kind is observed during the state of inflammation, but begins to appear when the process is drawing to a close. It is probable, therefore, that the chemical qualities of the secretion are altered together with the diminution in quantity.

It is not improbable that other changes in the process of secretion and those dependent on circulation take place during the state of inflammatory fever; but these are either too little known, or too inconsiderable to be much attended to, or well understood. It is therefore to be concluded, that those which I have now enumerated are the only constant and invariable changes which can be admitted as phenomena symptomatic of inflammation. They are always present, though in various degrees, whatever be the nature of the inflammation, and whatever be the texture affected. Others may be wanting; but without these, no inflammatory action is known to exist to any extent or for any time.

When the process of inflammation, however, as it takes place in the living body, is further observed, it is found that those general phenomena are accompanied with others, which vary in different forms of inflammation, and in different stages of its progress. These phenomena consist in suspension, interruption, or injury of some action or function, to the due accomplishment of which the inflamed part contributes, and to the healthy condition of which its sound state is more or less necessary.

The disturbance of circulation may be attended with changes in sensation and motion. Sensation may be diminished or increased or entirely destroyed, either in the organs of general or proper sensation. The voluntary motions may be diminished in strength, or entirely interrupted, or they may be rendered irregular; giving rise to local palsies or spasmodic motions. The intellectual functions may also undergo a temporary state of derangement in loss of memory, or of judgment, or in erroneous imagination, depending on the disorders of the organs of sensation. Phenomena of this description are connected with a morbid state of the brain, *cerebellum* or spinal chord, or sometimes of individual nervous trunks, and though they may occur in any inflammatory disease, in which these organs are affected, they are most commonly observed in inflammatory conditions of the brain, &c. or of the cerebral membranes. They occur to various extent in inflammation of the brain (*encephalia*,) or of its membranes, (*phrenitis, meningitis*,) acute or chronic, (*mollities cerebri*,) in cerebral hemorrhages, (*apoplexia, paralysis*,) &c. and in the action which terminates in water of the brain (*meningitis, arachnitis*.)

The disturbance of circulation may be accompanied with dis-

turbance of respiration, or with morbid forms of inspiration and expiration. These changes depend either on morbid actions in the larynx, windpipe, lungs, pulmonary membranes, diaphragm, or intercostal muscles; or on changes in the motion of the blood, in the pulmonary artery and veins; and sometimes on morbid states of the heart or its membranous capsule.

The disturbance of circulation may be accompanied with various derangements in the alimentary function. To this head practical observers refer furred or loaded tongue, especially when dry and chopped, or covered with a thick brown fur; squeamishness, sickness, vomiting, hiccup; obstinate constipation, great looseness, discharges of mucous, muco-purulent, purulent or bloody stools; griping pains (*tormina*) and *tenesmus*. Phenomena of this description generally depend on morbid states of the alimentary canal, and they are believed to indicate derangement in the functions of one or more of its parts; they are observed in inflammation of the stomach or intestines, or colon, or even some of the membranous appendages of these organs.

Derangement of the urinary secretion has been already noticed. It is further requisite to remark, that direct disease of the organs concerned in this secretion, or of those concerned in conveying the urine out of the system, for example inflammation of one or both kidneys, of the ureters, bladder, or prostate gland, or urethra, always occasions considerable derangement either in its secretion or excretion.

In observing the phenomena of inflammatory diseases, it is of the utmost consequence to attend to the changes in the several functions which have been now enumerated. It will be found that it is impossible to describe the symptomatic Fever of inflammation in general terms, or to limit it to invariable characters; and experience will show, that in one case the functions of circulation and respiration will be most affected; in another the functions of circulation and alimentation will be most affected; and in a third, the prominent features of the fever will be found in the derangement of sensation and intellect, with injury to the alimentary function. It will also be found that the degree in which one function is affected will often remarkably modify the morbid changes incident to the other. In inflammation of the chest, or its organs, in which the circulation and respiration, and the dependent processes of secretion, &c. are invariably much deranged, the intellect is of-

ten perfectly clear, sensation quite correct, and muscular motion regular and healthy; and even the alimentary function is rarely much impaired during the symptomatic fever of pulmonary inflammation.

On the other hand, when inflammation is seated in the brain or membranes, during which the patient may be delirious, or completely insensible, or affected with various spasmodic motions of the voluntary muscles, or lose the power of moving his limbs entirely,—the motion of the heart may not be quicker than natural, and in some instances is actually slower, and respiration may be in a correspondent state. On other occasions these functions are very considerably affected by the process which is going on in the head; and the patient may die with very laborious breathing and a small fluttering pulse.

Another instance of this modification of one order of processes in the living body by the condition of another, is presented in the inflammations of the alimentary canal. The morbid process in general produces a direct effect on the functions of this tube; and furred tongue, extreme thirst, squeamishness, loathing and actual vomiting, are the first results of its influence. While this disturbance, however, is occasioned in the alimentary function, that of circulation is often little or not at all affected. The pulse is sometimes not more rapid or harder than natural, and the respiration is quite healthy. There is reason to believe that in such instances, either the distressing sickness, which is known to influence the motion of the heart, prevents that frequent action which is sure to take place in ordinary circumstances,—or the inflammatory act may exist to a certain extent in sundry parts of the alimentary canal, without being followed by much disturbance in the function of circulation. These statements are illustrated and confirmed in the history of individual inflammations.

Medical writers, both theoretical and practical, have devoted much speculation and inquiry to what they termed the *proximate cause* of inflammation. I have already shown in what sense this term was understood, and in what sense it ought to be understood. The erroneous conceptions on the proper object of inquiry led to many useless hypotheses, and should now have the effect of showing us what points or questions are deserving of attention, and what may be, without injury or inconvenience to the healing art, safely neglected. There can

be little doubt, both from the phenomena of inflammation, from the results of dissection, which show its effects and sometimes its progress, and from the experimental researches of Hunter, Thomson, Wilson Philip, Hastings, &c. that the vital morbid process termed Inflammation is seated in the minute vessels, arterial and venous, termed the Capillaries. I have already, in my Elements of General Anatomy, Chapter VI. Sect. ii. enumerated the principal circumstances which it is useful to know in the present state of the inquiry ; and I have mentioned shortly the ordinary appearances and effects of inflammation as it occurs in the simple textures of the animal body. I doubt whether I could add much to what will be found there, without entering into the speculations, opinions, and experiments of the various writers, systematic and monographic, theoretical, practical, or experimental, on this subject. It is obvious that this is not the proper place to consider speculative matters, and that although it were, their consideration could add but little to the practical utility of this work. I therefore think it unnecessary to enter more fully on the subject in this place ; and I believe it will be more profitable, and not less interesting, to consider shortly the progress and terminations of inflammation, its varieties, and the circumstances which are either concerned in its production or its modification. In this view, the general facts only claim attention ;—for those which are peculiar to individual diseases I refer, as on similar occasions, to the descriptions of these diseases.

When the process of inflammation is commenced in any tissue or organ of the living body, it is in general accompanied with some degree of the constitutional symptoms which I have enumerated above. The extent to which this constitutional derangement takes place, and the peculiar form which it assumes, depends, as has been already stated, on the texture or organ affected, and on the severity or violence of the local action. It is further found that both local and constitutional symptoms vary, *1st*, according to the physiological characters of the tissues affected ; *2d*, according to the progress or peculiar stage of the process ; *3d*, according to the differences in the kind of the inflammatory action ; *4th*, according to sundry external circumstances or agents, the presence or absence of which aggravate or mitigate the violence of the disease.

Inflammation may be regarded as a process consisting of

several stages. It is true that this is an artificial distinction,—that these stages are not so distinctly separated in nature as they are generally represented in the writings of physicians,—and that they glide into each other by insensible shades. But to this objection it may be justly answered, that, unless a complicated process be distinguished into parts, and examined in this form, the human faculties must be unable to study its nature and peculiarities. When any tissue or organ becomes the seat of inflammation, it is found to present *one* appearance at the beginning of the process, *another* when this is established, a *third* during its decline, and a *fourth* at the period of its conclusion. The local and constitutional signs, with few exceptions, undergo corresponding changes;—and it is reasonable to think that the intimate knowledge of these changes in the progress of inflammation is essentially necessary to effective treatment.

It must be acknowledged, however, that little is known of the progressive steps of the process; and pathological writers have satisfied themselves with distinguishing, and sometimes describing, the modes merely in which it may terminate. These are resolution, deranged secretion, effusion of serous, sero-purulent, or purulent fluid, exudation of albuminous fluid producing adhesion, effusion of blood or bloody fluid, softening, induration, hypertrophy, suppuration, ulceration, granulation, cicatrization and mortification.

1. Termination by resolution is generally the work of nature, but it may be promoted by art. It may be defined to be that termination in which all the symptoms, local and constitutional, gradually disappear, with or without sensible evacuation,—and in which the part that had been inflamed assumes by degrees its natural state, without suffering derangement of structure or properties. This, which is effected chiefly by the absorbent power of the minute veins and the contractile power of the capillaries, is the spontaneous cure of inflammation; and is the only *proper termination* of the process. The others, which I have yet to enumerate, are rather *effects*, either immediate or remote, of the process of inflammation.

2. Derangement of secretion is a frequent effect of inflammation, both in the secreting membranes and in the glands. In the commencement of inflammation, all the natural secretions are either suppressed or impaired. As the process advances,

and is established, they become at once preternaturally augmented and much altered. And when the process declines, the membrane or gland is left in an enfeebled and inert condition, seldom secreting with the same regularity as in health. In the mucous membranes, in which these successive phenomena are most distinctly observed, the membrane, when swelled and injected at the beginning, is preternaturally dry, and its proper secretion is impaired and interrupted for some hours; it then begins to secrete thin serous fluid copiously; when the process is at its height this becomes thick, viscid, and opaque, sometimes puriform; and as it declines, the secretion becomes less abundant, and at length returns nearly to its normal quality and quantity, but leaving the membrane tender, irritable, and relaxed.

3. Effusion consists in the separation or secretion of an unusual quantity of fluid from the capillaries of the transparent or serous membranes, or of the filamentous tissue, either subcutaneous, intermuscular, or organic. It is generally supposed that this unusual quantity of fluid is a mere increase of that which these vessels appear in the healthy state to furnish. There is reason to believe, however, that the fluid secreted or discharged from the transparent membranes (*pleura and peritonæum,*) during inflammation, or as an effect of this process, is always specifically and chemically different from that which is formed in the healthy state. A fluid discharged in similar circumstances into the interstices of the filamentous tissue, and producing the swelling termed *œdema*, has, from its resemblance to the *serum* of the blood, been denominated *serous*; but accurate researches on these fluids and their peculiarities are still requisite.

4. One point which I conceive I have ascertained by a number of observations sufficiently extensive is,—that the fluid effused from any tissue in the state of inflammation is in all cases poured out first in the liquid form, and that it undergoes separation into a liquid and more consistent part. The liquid part, as I have elsewhere shown under the pathological anatomy of the serous membranes, constitutes the *serum*, or sero-purulent fluid of the *pleura, pericardium, and peritonæum*, and the serous, sero-sanguine, or sero-purulent fluid, infiltrated into the interstices of the filamentous tissue; while the more consistent is the coagulable or coagulated lymph, which unites contiguous

membranous surfaces, obliterates the cells of the filamentous tissue, and, when effused into that of the internal compound organs, as the lungs, &c. produces consolidation, induration, and hepatization of their substance. Hence effusion, adhesion, and induration, may be regarded as joint, or simultaneous, or successive effects of the same process. For the different details on this process, and its effects, I refer in general to my Elements of Pathological Anatomy.

5. In some examples of inflammation taking place in certain tissues, and under particular circumstances, bloody fluid or blood more or less pure issues from the surface of a membranous covering, or from the substance of the affected organ. Thus in inflammation of the mucous membranes, it is not uncommon for the diseased surface to secrete not only much morbid mucus, but mucus streaked with blood, or even pure blood. In the latter case, the disease is denominated a hemorrhagy.

Thus in bronchial inflammation and congestion of the pulmonic tissue, blood may be discharged from the bronchial membrane or the pulmonic substance, or both. In dysentery, blood is often discharged from the mucous membrane of the colon, and in hemorrhoids from that of the rectum. And in various inflammatory affections of the womb, blood issues more or less profusely from the mucous surface of that organ. In these examples of morbid action, though the discharge of blood is necessarily the most prominent character of the morbid action, the pathologist ought not to overlook the state of the capillary circulation, which causes the hemorrhage, and which always consists in congestion and accumulation more or less intense, and in all respects similar to that of inflammation.

6. Softening (*Malacismus*; *Exallaxis*; *Sphacelismus*;) or preternatural diminution of consistence, is an effect of inflammation, which in different tissues is liable to ensue. The tissues in which it is most frequent are the brain, spinal chord or nerves, the lungs, the uterus, and the bones. It consists in the more or less complete separation of the component atoms of these tissues, whether fibrous, globular, or amorphous, by the destruction or dissolution of their filamentous tissue, and occasionally, if not constantly, with the substitution of serous, sero-albuminous, sero-sanguine, or sero-purulent fluid. The characteristic organization of the tissue is, indeed, more or less completely destroyed. In certain tissues, especially that of the

lungs, and perhaps that of the brain occasionally, softening is analogous to mortification of other tissues. In the brain, however, it is most usually analogous to suppuration.

One variety of softening is often observed in parts or new structures, originally hard, and consists not so much in the process now mentioned, as in the slow solution or liquefaction of the tissue or substance, partly by disruption of its particles, partly by death of their individual atoms, with the admixture of blood, serous or sero-purulent fluid. This softening, which takes place in encysted tumours, tyromatous or scirrhus tubercles, and in most of the adventitious tissues, is a spurious variety of suppuration.

7. Induration (*Scleroma*, *Verhartung*), or preternatural firmness, is a usual concomitant and effect of the process of inflammation. The process rarely, indeed, exists for a few hours or days in any tissue without rendering it considerably harder and more resisting than natural. In the external part of the body this is seen in inflammation of the skin and filamentous tissue, in which the inflamed parts are much harder and firmer than natural; and every inflammation of the filamentous tissue is accompanied with hardness more or less extensive. This hardness, which is also accompanied with swelling and enlargement, depends partly on the excessive distension of vessels by blood, and partly on the effusion of sero-albuminous fluid.

The latter circumstance explains the presence of induration as a consequence of the inflammatory process. The sero-albuminous fluid, though first, when effused, liquid, and homogeneous, is speedily separated by virtue of its property of spontaneous coagulation into two parts,—the serous, liquid, or non-coagulable, and the albuminous, consistent, or coagulable. The former is the cause of the œdematous swelling already-mentioned as often accompanying inflammation, and, after remaining for some time in the interstices of the filamentous tissue of the part, may be removed by the absorbent property of the capillaries and minute veins. The latter, in the form of minute amorphous masses, disposed between the filamentous fibres, or the component atoms of the tissue, augments its volume, and the space which it occupies, agglutinates contiguous parts, and, eventually contracting and becoming consolidated, increases much the natural consistence and density of the tissue in which it has been deposited. In this manner induration takes place in the subcu-

taneous and intermuscular cellular tissue after an abscess, in the female breast or male *testis*, and the liver of both sexes, after inflammation, and in the pulmonic tissue after an attack of peripneumony. In the glands now mentioned, and even in the prostate gland, inflammatory induration has been repeatedly mistaken for scirrhus induration. This error the accurate pathologist will avoid. Inflammatory induration occasionally disappears, and is never attended with acute pain. Scirrhus induration never disappears, but proceeds to disorganizing softening, and atomical mortification, and is always attended with stinging darting pain, and flushes of burning heat.

8. *Hypertrophy. Hypertrophic augmentation.* Any tissue or assemblage of tissues may acquire, in consequence of inflammation, an increase not only of consistence and density, but of their natural size, so as to occupy more space than in their healthy and natural state they did. Thus the substance of the lung, during and after peripneumony unresolved, becomes not only dense, firm, inelastic, and uncrepitating, but larger and more prominent than natural, and when the sternum is removed, appears to protrude from the cavity of the chest. The liver in like manner, or the spleen under the process of inflammation, may acquire a degree of increase sufficient to cause a remarkable degree of swelling visible externally; and the female breast and *testis* or prostate gland of the male may in like manner acquire a very great degree of increased size. Inflammation attacking the tissues of the alimentary canal also induces thickening and induration of the cellular and muscular coats. In all these cases the parts are said to be in a state of *hypertrophy*, providing the marks of acute inflammation are gone. About the propriety of the term thus applied it is perhaps unnecessary to argue, and it may be conveniently used as a mere name to designate the combined characters of enlargement, increased density, and firmness of tissues. But it ought not to be forgotten in its use, that the process by which it is caused is inflammation generally of a chronic character, and that the increased nutrition is the result of a morbid action. The heart is the organ in which its use is least objectionable. The characters of hypertrophy are simple enlargement, and increased density of the constituent elementary tissues of organs.

9. *Suppuration.* When inflammation does not terminate in resolution or the exudation of albuminous and coagulable fluid, or the

extravasation of red blood, or bloody serum, it may, either with the three latter circumstances or without, give rise to formation of a greater or less quantity of purulent matter. This secretion may take place in any tissue of the human frame, but is most frequent in the filamentous or cellular, in the serous and in some forms of the mucous, tissue. In each of these tissues, however, the purulent fluid varies in appearance and other qualities. It has been established by accurate observations, especially those of Brugmann, Hunter, and Home, that purulent fluid may be formed by simple secretion without breach of surface. But it also results from the phenomena of suppuration in the filamentous tissue, and in the substance of the glands, that portions, more or less extensive, may be converted into purulent matter by a species of destruction or dissolution of their tissue, which can no longer in that case be recognized.

The occurrence of suppuration as a consequence of inflammation, is conceived to be indicated by the existence of hectic or habitual fever. This, however, is a mistake. Though the suppurative process in an internal organ does give rise to hectic fever, that fever may exist in a very exquisite form, where no suppuration has taken place. It then depends on the chronic congestion of the vessels, which is the essential and invariable circumstance necessary to its establishment.

9. When breach of the continuity of any tissue does take place, it forms an *ulcer* (*Ulcus*,) and the process is denominated ulceration (*Helcosis*.) This process also presents peculiar phenomena, different from each other in the cutaneous, the mucous, the serous, and the filamentous tissues.

10. After suppurative or ulcerative destruction of certain tissues, especially the filamentous, the injured parts may be more or less completely repaired by the vessels of the tissue. This process, which is denominated *Granulation* and *Cicatrization*, is effected by the capillaries depositing lymph in masses, which assume an irregular, orbicular, or hemispherical shape, like minute grains (*granula*,) which receive into their substance the prolongation of minute vessels, which freely anastomose with each other, and also secrete lymph, which assumes the same disposition. The lymph of these bodies thus organized becomes firmer and more solid every hour; their vessels contract, and the granules of lymph also contract, and even-

tually, when they reach the level of the skin, they become covered by an albuminous exudation, which afterwards forms skin and cuticle; or the original skin may unite so closely over the shrunk granulations, as to leave only a sear or scar in the site of the original suppurating surface. The latter process is distinguished as that of *Cicatrization*.

It would be proper to distinguish the process of Granulation from the orbicular-shaped masses of lymph, by the deposition and organization of which it is effected.

11. Mortification or Gangrene is a termination of Inflammation in certain tissues, in which either those previously mentioned do not take place at all, or in which those of suppuration, ulceration, or granulation, may take place partially. Of gangrene, not only two varieties but two stages are distinguished. Gangrene may be either humid or dry, and it may be incipient or inflammatory, and confirmed or essential.

12. Gangrene is said to be humid, when the tissues of a part, after being red, hot, painful, swelled, and hard, acquire a dark-red, livid, or violet hue, become less painful or cease to be sensible, more or less soft and doughy, and present the cuticle elevated into large ovoidal blisters or *phlyctenæ*, containing a dark-red livid-coloured serous fluid.

The most distinct examples of Acute, Inflammatory, or Humid Gangrene, are seen either in attacks of Rose, or in severe Compound Fractures of the metatarsal bones of the foot, or the metacarpal bones of the hand, in compound luxation of the ankle or elbow-joint, in contused wounds of the extremities generally, and in the severe and complicated injuries resulting from gun-shot wounds.

In cases of this kind, Gangrenous Inflammation appears in the following manner. After more or less swelling, heat, and painful tension, lasting for ten, twelve, or eighteen hours, the limb is observed to be diffusely swelled, with a dull red colour of the skin, which is much stretched, hot, tender, and painful. The upper or spreading margin of the red skin is observed to be bounded by a distinctly circumscribed edge, the outline of which may be traced by a pencil. As this spreads upwards, the swelling follows it, and is found to be doughy, inelastic, and not unfrequently crepitating or emphysematous, from the diffusion of air in the cellular tissue. About the second day, or after forty-eight hours of these phenomena, the

cuticle begins to be detached and elevated in several parts by the effusion of dark-red or wine-coloured sero-sanguine fluid, so as to form large violet-coloured pushes or *phlyctænæ*. This process is accompanied with fever of typhous or typhoid character, which generally proves fatal in the course of the fourth, or before the close of the fifth day. This has been denominated Acute, or Spreading, or Traumatic Gangrene.

In some favourable circumstances the acute spreading gangrenous inflammation may stop more or less suddenly; and various parts in the vicinity of the injured tissues become of a dark-gray colour, soft, insensible, and even void of circulation and transpiration. These portions are dead or mortified, and are then denominated Sloughs; and, as they react on the contiguous living parts as foreign bodies, they give rise to secondary inflammation, suppuration, and ulceration, by which they are detached from the former.

In other instances, this previous process of inflammation is either so indistinct in symptoms, or so rapid in progress, that a part appears to become speedily black or brown in colour, dry, somewhat hard and insensible; but in this case, the spreading nature of the disorder is not observed; and, indeed, the mortified parts are always more or less distinctly circumscribed and separated from the sound parts by a sudden and abrupt transition. This is denominated, from the circumstances now enumerated, Dry Gangrene. (*Gangræna Sicca*; *Sphacelus*.)

These forms of gangrene correspond respectively to the Humid or Moist Carbuncle, and the Dry Carbuncle (*Anthrax*) of Orræus, formerly mentioned.

Inflammation in any particular tissue or organ of the human body has been already said to be attended with an assemblage of febrile symptoms, which vary according to the part affected, the stage of the process, the nature of the action, and the treatment observed. These differences will be most conveniently explained under the respective individual heads.

I must here, however, observe, that when the process of inflammation has continued so long, and become so obstinate, that the capillaries of the part are habitually distended, and the blood does not move with due facility or promptitude through them, and either the effusion of lymph, or serous, or sero-sanguine fluid is going on into the filamentous interstices, the skin becomes habitually and alternately dry and moistened with

profuse sweats, the urine is habitually hypostatic, the pulse is constantly from 20 to 30 or 40 beats more frequent than natural, the flesh in the meantime wastes, the strength decays, and the individuals slowly but certainly pine away by a process of progressive emaciation. The feverish symptoms now enumerated were designated by the Greek physicians by the appropriate name of hectic or habitual Fever (*εκτική πυρετός*); and the appellation has been retained by the moderns.

§. II. GENERAL ETIOLOGY OF INFLAMMATIONS. — The general remote causes of inflammations may be distinguished into two orders,—the Predisponent and the Exciting.

The Predisponent Causes of Inflammation are, a plethoric habit actually existing, or those circumstances which, either separately or jointly, induce a plethoric habit; as full living, and especially the liberal use of animal food, habitual addiction to conviviality and the pleasures of the table, with the frequent or habitual use of vinous stimulants and fermented liquors, or distilled spirits; indolent or inactive habits, or a transition, more or less sudden, from habits of exertion and labour to those of sloth and inactivity; infancy, youth, and manhood; male sex; and occasionally sexual differences; the winter or spring season, and occasionally a peculiar state of the atmosphere, especially that in which the vicissitudes are sudden and great, and the changes of temperature and humidity very frequent.

The Plethoric Habit, which is conceived to predispose to inflammatory attacks, is not very well defined; and perhaps it is not susceptible of accurate definition, as its existence is rather a matter of inference than of direct demonstration. It is generally known in this particular instance under the name of the Phlogistic Diathesis or Disposition; (*Diathesis Phlogistica*; *Diathesis Inflammatoria*.) It is believed to be indicated by the tendency to inflammation in various tissues and organs upon very slight causes, by the constant or habitual appearance of the buffy coat in the blood, and, I may add, by certain morbid states as to quantity and quality in the secretions, but especially the urine. Vide Introduction, 35, p. 16.

To the tribe of Exciting Causes may be referred all those circumstances which, either applied to, or operating upon the human body, more or less directly, may give rise to a distinct inflammatory attack. Of this kind are extreme cold or intense heat; the application of cold, either in the form of cold air,

cold water, or cold drink to the body previously heated ; excessive corporeal exertion, so as to induce much heat and sweating, and thereby a temporary febrile state, as in running, dancing, playing at cricket, shooting, or long-continued walking ; intense and long-continued intellectual exertion, or intense mental emotions, often accompanied with loss of sleep ; articles of food or drink which derange the action of the stomach and bowels ; mechanical injuries, as falls, contusions, wrenches ; incised, lacerated, or punctured wounds ; fractures, simple and compound ; dislocations, simple and compound ; scalds, burns, and scorchings ; various injuries effected by chemical agents, &c. ; in short, any cause or causes which produce on the living tissues a strong, intense, or injurious impression.

All these various circumstances agree in the general and common character of deranging the properties of certain tissues or organs so considerably, as first to impair, or even extinguish them, and then to rouse these properties to an inordinate degree of action, or, what has been denominated in language borrowed from the science of mechanics, Reaction. It may be doubted whether, in all instances, this mode of expression is either legitimate or true ; for what is denominated Reaction or intense Action is often manifestly diminished or impaired Action, and is always disordered or perverted Action. The theory of the connection between the exciting causes of Inflammation, and the process itself, may be briefly stated in the following manner.

All the Tissues of the Animal Body are endowed with certain properties or faculties which, whether connected with their anatomical constitution or otherwise, continue in a certain state of integrity and perfection, so long as they are not injured by foreign agents. Without entering into minute detail, it is sufficient to observe, that the great effect of the healthy state of these properties is to maintain, in a natural and healthy state, the capillary circulation, and its two subordinate processes, Nutrition and Secretion, whether dependent on proper sensibility or mobility of the Capillaries, or on powers communicated by the Nervous system. When, from any external or internal cause, either the structure of one or more tissues is injured, or the properties are disordered, the sensibility of the capillaries is impaired, whether by diminution of inherent power or of nervous energy, and they become either less

capable than formerly, or wholly incapable of transmitting the contained blood, and, consequently, of contributing efficiently either to nutrition or secretion. Accumulation takes place with interruption or diminution of nutrition and secretion; and, unless some means intervene, this derangement of the local circulation is converted into the peculiar disordered action constituting Inflammation, with all its train of consequences.

It is perhaps in this place proper to mention, that Inflammation has been distinguished into different species or sorts, according to some of its Remote Causes, real or imaginary. The whole of the varieties may be referred to two general heads. Those dependent on ordinary or common causes, and those depending on specific causes. The first embraces all sorts of inflammation occurring in the several tissues and organs. The second comprehends such modifications as are believed to result from the presence either of a peculiar *diathesis* or an actual disease. Such are Strumous inflammation, or that depending on the Strumous or Scrofulous Diathesis; Scorbutic inflammation, or that depending on the presence of a Scorbutic tendency; Syphilitic or Venereal inflammation, or that depending on the presence of an Actual venereal taint; and Cancerous inflammation, or that resulting from the irritation and disorganization of *Carcinoma*.

§ III.—GENERAL THERAPEUTIC PRINCIPLES OF THE TREATMENT OF INFLAMMATION.—The Treatment of Inflammation may be distinguished into two general Divisions;—the employment of remedies adapted to the removal or mitigation of the local affection, and the administration of remedies adapted to the removal or extinction of the general symptoms. Though, in consequence of the intensity of the latter class of complaints bearing a very accurate proportion to the severity of the local inflammation, the remedial measures calculated to remove or assuage the latter, are also well suited to the mitigation of the former, and in many cases the Febrile disorder subsides as the local disease is controlled; yet it is proper to observe some distinction both in specifying and in describing the employment of individual remedies of each class. In the management of inflammation, in short, the physician should always direct his attention to the nature and tendency of the local affection, and should observe assiduously the state of the inflamed organ, and its changes under the use of remedies; but he should also not neglect the

general febrile symptoms, and should arrange his therapeutic measures accordingly.

It has been already shown that inflammation in every texture has a tendency to the formation of new products, and the destruction, more or less extensive, of the tissue in which it takes place. In certain favourable circumstances, indeed, of constitution and vigorous organic properties, or under the seasonable use of various agents, it is possible for the inflammatory action to be resolved; and the chief duty of the rational physician is to know the circumstances under which this is most likely to take place, and by all means to prevent the formation of new products, and the destruction of the tissue.

Though we possess no direct means of accomplishing these objects, it is always practicable to effect them more or less perfectly by the use of indirect measures. As inflammation depends on the concurrence of remote exciting causes and predisposition with proximate causes, the only direct curative method is, by putting a stop to their operation, to counteract, if not to subdue, their effects. When the adoption of these measures is inadequate to check the new orgasm, as all the morbid products are prepared from the blood, by diminishing the quantity of that fluid generally, and diminishing the proportion contained in the vessels of the inflamed tissue, resolution is more readily effected than if the vessels be left to themselves. Though it is impracticable to restore their tone and energy to the capillary vessels of an inflamed part, it is possible, by diminishing the mass of their contents, to give them less to do, and to place their exhausted powers more upon a level with the duty which they have to perform. It is hence necessary, in all cases of inflammation, to employ more or less freely those measures which act on the sanguiferous system.

The first and most effectual of these is blood-letting, general and local. The first is indicated when the local inflammation is accompanied with great and evident fever, when the patient is young, robust, and vigorous, when the disease is in its commencement or fully established—not when it is declining, when the inflammation is seated in an organ essential to life, and when, consequently, it is liable, if allowed to proceed, to injure irreparably the structure of the part.

In order to be efficient in controlling inflammation, full bleeding should be carried to the extent of making a great and

evident impression on the vascular system, especially as indicated by the change in the number and beats of the pulse, by the appearance of the countenance, by the relief afforded to the urgent symptoms of the disease, especially the pain, and by the amelioration effected in the functions of the affected organ. If these objects be not attained by one blood-letting of considerable amount, it is requisite to repeat the evacuation; and in some instances of visceral inflammation, the extent to which the evacuation requires thus to be carried, both in amount and by repetition, is very great. It may be from 60 to 100 ounces in adults. Blood-letting in this manner operates at once on the local affection, and on the general disorder.

In most instances of inflammation seated in any important organ, with evident symptoms of symptomatic fever, one, two, or three large blood-lettings from the system will be adequate to subdue the disease. In some instances, however, in which the symptomatic fever is either not violent in proportion to the local affection, or is already subdued by general evacuation, or in which it is inexpedient to carry general evacuation farther, it becomes necessary to draw blood from the vessels of the inflamed part, or from the nearest accessible region to it, for instance, from the temples, scalp, frontal or occipital regions, in inflammation of the brain or its membranes; from the surface of the chest, sides, or the inter-scapular region, in inflammation of the lungs, or their bronchial membrane; and from the surface of the belly, in the case of inflammatory symptoms in the peritoneum, or any of the organs invested by that membrane. These local evacuations, which may be accomplished either by the application of leeches, or by scarifying and cupping, or by numerous minute punctures, not only tend to unload directly the vessels of the part, and by thus relieving them of part of their contents, enable them to propel the residual mass more easily, but by thus diminishing directly, swelling, and abating distension, tend materially to relieve painful sensations, heat, and other symptoms, and thereby tend to alleviate sometimes the signs of general disorder.

The curative effects of local blood-letting are most clearly evinced in inflammation of the eyes, of the throat, of the articulations, and their constituent tissues, of the breast of the female, and the *testis* of the male, and in the inflammatory swelling, pain, and redness attending attacks of rheumatism, gout,

and rheumatic gout, because in these instances, the blood, which is most conveniently drawn by leeches, can be taken from vessels very closely connected with those of the affected organ.

Upon the same principle, in inflammation of the mucous surfaces, it is desirable, by applying leeches to these surfaces, if accessible, to draw blood immediately from them. Thus, in inflammation of the eye it is common to scarify the *conjunctiva*, and occasionally to apply leeches immediately upon it; and in inflammation of the rectum and vagina, I have directed the application of leeches to the mucous surfaces of these cavities with great benefit.

Evacuation of blood by means of the cupping-glass is a more precise method of depletion, and is suited to affections of the lungs, of the joints, and of the *fasciæ*, and the nervous trunks.

Of local bleeding, by means of numerous punctures or incisions, for the removal of inflammation, the most favourable examples are seen in diffuse inflammation of the cellular membrane and skin, in whitloe, in inflammation of the *fasciæ* (*Sparganitis*,) and in the erysipelatous inflammation attacking the lower extremities of seamen. The practice of drawing blood, indeed, from the vessels of inflamed parts by means of incisions is suited to almost every species of inflammation affecting the exterior tissues of the body. It is found by far the most effectual remedy in general inflammation of gun-shot wounds, and other contused wounds; it might occasionally be used with advantage in controlling inflammation of the articular tissues; and it has been proposed by Dr Pritchard as to the scalp, in order to mitigate the intensity and arrest the progress of cerebro-meningeal inflammation.

With the means now mentioned, it is necessary to conjoin the use of various auxiliary local remedies, which are conceived to operate in abating the intensity of the inflammatory process. These are various; but it is at present convenient to enumerate them in the order of Relaxants or Emollients, Refrigerants or Sedatives, and Revellents or Counter-irritants.

The administration of Relaxants is found to be useful in the early stage of many inflammatory affections, in abating some of the painful sensations with which the process is attended. The most effectual, and perhaps that to which all remedies of this kind are referable, is warmth applied in the humid or dry form, more or less directly, to the affected part. Of this description

are fomentations by warm water, either pure or medicated, fomentations by means of watery vapour, and fomentations by means of poultices. The whole of these agents operate on the general principle of diminishing tension, relaxing the rigidity of parts almost mechanically, and favouring, by the least painful means, the tendency to one or other of the natural terminations. The vapour of warm water is often very effectual in relieving the sense of soreness, rawness, and dryness of several of the mucous surfaces when inflamed. The best rule in the employment of this agent is to make the temperature agreeable to the feelings of the patient. Inflammation in the eyes, the testicle, or any other gland, is often thus most readily treated.

Various applications of a Refrigerant or Sedative character are employed in certain forms of inflammation with much advantage. Of most of these the essential principle is cold in whatever mode applied, whether by means of cold water, ice, snow, saline solutions, as sal-ammoniac or common salt, or the metallic astringent solutions, as sugar of lead, white vitriol, &c. Their employment is chiefly indicated in the case of inflammations seated on the surface, and unconnected with disorder of the lungs, heart, stomach, or liver, or intestines,—after and along with suitable evacuation, and when the sense of heat is very great, and evidently contributes much to the sufferings of the patient. Cold applied to the shaven scalp is a powerful means of abating inflammation or congestion of the brain or its membranes. It is very effectual in abating the scorching heat and pain of erysipelatous inflammation; and it often is beneficial in alleviating the burning heat and swelling of gout. The application of cold is contra-indicated in inflammatory affections of the throat, windpipe, lungs, heart, stomach, and intestines. In affections of the glandular system it is injurious at the commencement, but favourable at the termination.

The use of the metallic astringent salts is principally indicated in inflammations of the mucous surfaces without much congestion of the vessels, and in abrasions of the skin.

Sedative and Narcotic substances are not unfrequently employed as local applications in the treatment of various inflammatory affections. Of this kind are watery solutions of opium, decoction of poppy heads, decoction or infusion of hemlock, bitter-sweet, henbane, deadly night-shade, and similar narcotic

substances. It is extremely doubtful whether the application of such means is accordant with correct physiological principles; for as inflammation is certainly not primarily an affection either of the inherent properties, or of the nervous system of the tissues, it is difficult to perceive in what manner narcotics can operate efficiently. By diminishing sensibility, they may alleviate pain, or prevent it from being felt very acutely; but they cannot operate on the process of inflammation itself. At the close of the disease, however, and after suitable evacuation, they may be useful in abating tenderness or morbid sensibility. In general, they are applied along with cold; but the decoction of poppy capsules is a convenient mode of applying a warm sedative in cases of inflammation of parts on the surface of the body.

Revellent or Counter-irritant agents, or those which, by irritating or inflaming a sound surface, diminish the inflammation of a diseased organ, are very beneficial under certain conditions and restrictions. Considered according to their physiological effects in the treatment of inflammation, they are either rubefacient, or such as cause erythematous redness,—vesicating, or such as cause erysipelatous inflammation,—vesiculating, or such as bring out vesicles,—pustulo-facient, or such as cause pustular inflammation,—and cauterizing, or such as produce death, more or less complete, of the surface.

For effecting the first purpose, the application of sinapisms, friction by the ammoniated oil, or turpentine, are the most usual means. Vesication is most usually induced by the ointment of the blistering fly, but may be effected by the sudden application of boiling water or steam. Vesicular inflammation is excited by friction with croton oil; pustular inflammation is induced by tartar-emetic ointment; and death of the surface may be occasioned by any of the mineral acids, caustic potass, butter of antimony (the chloride,) or the hot iron.

Erythematous counter-irritation is chiefly useful in rheumatism and rheumatic or neuralgic pains. Vesication is most generally practised in all instances of deep-seated inflammation of internal organs over the corresponding surface of the skin. The principal condition regarding its employment is, that in cases of inflammation with acute fever, it ought not to be put in practice without previous blood-letting, or until the symptoms of general fever, and the urgent pain of the part, have

been abated by these and similar evacuant measures. A species of imperfect vesication, induced by nitrate of silver, is sometimes beneficial as a counter-irritant; but it is most effectual as a check to spreading inflammation, and as a means of inducing a new action. The counter-irritant effect of friction with croton-oil or tartar-emetic ointment is chiefly suited to moderate the violence of chronic inflammation, seated either in the thoracic or abdominal viscera. Caustics, actual and potential, or those agents which destroy part of the integuments, and are hence followed by a long-continued ulcerative inflammation, are, perhaps, still more effectual in counteracting the progress, and moderating the intensity, of chronic inflammation of the thoracic viscera, of the cuticular tissues, and of the bones. Setons and issues act nearly in the same manner. The whole of these remedies, which operate more or less upon the principle of transferring morbid action from one tissue or set of tissues to another, are chiefly indicated in the treatment of inflammatory action, which has either been chronic from the commencement, or which, after being acute, has become chronic.

Such is a general view of the principal remedies to be employed in the treatment of the local affections in inflammation.

The management of the symptomatic fever of inflammation is to be conducted upon the general principles already explained in considering the treatment of Simple Continued Fever, and may be briefly designated under the general name of the Antiphlogistic Treatment. These consist, together with blood-letting, of low diet, the use of diluents, purgatives, emetics in nauseating or diaphoretic doses, especially tartar-emetic and other antimonials, mercurials in alterative doses, especially calomel combined with opium, and such sedative medicines as foxglove and lead. The particular circumstances requiring the use of each of these remedial agents, or two or more combined, will be fully considered under the head of Particular Inflammatory Diseases.

It is requisite, nevertheless, here to mention, that, in the treatment either of the symptomatic fever of inflammation, or the still more general affection of the system denominated the *phlogistic diathesis*, the principal object is, to employ that system of dietetic rules named the Antiphlogistic Regimen. As these symptoms acquire much of their intensity from the general fulness of the vascular system, and as this is always closely

connected with the quantity and quality of articles employed as food and drink, it becomes necessary to regulate both in such a manner, as to abate, diminish, and obviate that congestion or plethora which the vascular system thus acquires, and in this manner to counteract the irritation thus induced.

The most effectual mode of accomplishing these purposes, is to withdraw entirely all animal diet, and every sort of food or drink containing animal matter, and all malt or fermented liquors, and to restrict the patient rigidly to the use of aqueous diluents, the vegetable ptisans, and such small quantities of farinaceous food, and the saccharine fruits, as may be sufficient to sustain life, without stimulating in any degree the heart or arteries. The employment of cathartic medicines is also requisite to remove morbid secretion, to prevent accumulation, and remove all irritation from the mucous membrane of the alimentary canal. If, under these means, the symptoms of general phlogistic disposition do not appear to abate, the appropriate remedy is tartar-emetic in divided doses, or digitalis, given so as to produce some degree of giddiness, faintness, and complete loss of appetite.

In scrofulous inflammation, or inflammation dependent on the strumous *diathesis*, and in chronic and asthenic inflammation generally, it has been supposed that this proscription of animal diet and fermented liquors is neither requisite nor beneficial; and many practitioners have represented that they have beneficially recommended these articles, sometimes in moderate quantities, sometimes rather liberally. That there may be cases of asthenic and strumous inflammation, in which the use of animal food and wine or malt liquor may seem to be beneficial, is not impossible. But it must be remembered that the recovery of such cases or the subsidence of the inflammatory symptoms does not prove the safety or beneficial influence of the practice. In short, it is the general result of accurate observation and long experience, that even in strumous and chronic inflammation it is beneficial to regulate the diet, to diminish the allowance of animal food, if not to withdraw it, and to restrict the patient to diet consisting chiefly of milk, grain, and similar unstimulating articles.

When inflammation has proceeded to suppuration, it is generally advantageous to augment the allowance of food, and in some instances to allow a proportion of wine or malt liquor.

For the local management of the effects of inflammation, I refer to the Treatises on Surgery.

In the treatment of the phlogistic diathesis and chronic inflammation, much attention to clothing and exercise is also requisite. As in these states of the system the vessels of the skin are not only less energetic than usual, but liable to have their circulation and secretions readily deranged by exposure to cold or atmospheric vicissitudes, it is of the utmost consequence to prevent the operation of these agents, or to counteract their effects. This is to be done, in the *first* place, by means of flannel clothing, or clothing at least of woollen materials; in the *second* place, by frequent frictions of the surface, so as to promote the circulation; and, *thirdly*, by exercise, either active, to as great an extent as the strength of the patient will endure, or, if this be impracticable, by means of passive exercise or gestation.

Cold bathing, which is occasionally recommended, is always unsafe, and should never be allowed unless under the superintendence of the medical adviser. Warm or tepid bathing is much more beneficial; but even this must be permitted with due attention to its effects.

I shall now treat of Inflammations as they appear in the following Tissues. I. The Skin; II. The Mucous Membranes; III. The Serous Membranes; IV. The Compound Organs; V. In Various tissues, simultaneously or successively.

CHAPTER I.

CUTANEOUS INFLAMMATIONS.

Exanthematologia, or An Attempt to give a Rational Account of the Eruptive Fevers, &c. by Thomas Fuller. 4to. London, 1730.—*De Morbis Cutaneis*, A Treatise of Diseases incident to the Skin, in two parts, by Daniel Turner of the Coll. of Phys. Lond. 4th edit. Lond. 1731. 8vo.—*Tractatus de Morbis Cutaneis Auctore Medico Monspeliensi*. 12mo. Amstelod. 1760, supposed to be by Astruc.—Lorry *De Morbis Cutaneis Tractatus*. Parisiis, 1779. 4to.—Josephi Jacobi Plenck, Chir. Doct. neonon Chir. Anat. etc. Profess. Regii, publici ac ordinarii in Regia Universitate Budensi *Doctrina de Morbis Cutaneis qua hi Morbi in suas Classes, Genera et Species rediguntur*. Edit. 2da aucta. Viennæ, 1783. 8vo.—Schmidt, *Cutis Morbi ex materia animalis mixtura et forma mutatis cognoscendi Dissert. Inaug.* Halæ, 1799.—Chiarugi *Saggio Teorico Pratico sulle Malattie Cutanee sordide osservate nel R. Spedale di S. Bonifacio di Firenze*. Firenze, 1799. ediz. nuova, 1807.—Robert Willan, *Description and Treatment of Cutaneous Diseases*. 4to. Lond. 1798–1808.—Danzer, *Synopsis der Hautkrankheiten*. Landshut, 1808.—Alibert, *Description des Maladies de la Peau observées à l'Hopital de St Louis*. Paris, 1806, et *Precis Theorique et Pratique sur les Maladies de la Peau*. Paris, 1810.—Kieser, *uber das Wesen und die Bedeutung der Exantheme*. Jena, 1812.—Marcus *die Exantheme ihre Erkenntniss und Heilart*. Nürnberg, 1812.—Thomas Bateman, *a Practical Synopsis of Cutaneous Diseases*. London, 1813–14, &c. 6th edit. 1824.—*Delineations of Cutaneous Diseases*. 4to. London, 1817.—Nussard *Skizze einer Dermato-Pathologie*. Prag. 1816.—S. Plumbé, *a Practical Treatise on Diseases of the Skin*. London, 1824. 2 edit. 1827. 8vo.—P. Rayer, *Traité Theorique et Pratiques des Maladies de la Peau* Vol. i. and ii. Paris, 1826.—Alibert, *Monographie des Dermatoses*. 4to. Paris, 1832.

If the animal body be considered as a complex whole, consisting of various organic elements, or component tissues, liable, among other disordered states, to that named Inflammation, it is certain that this process is most obvious in the skin, and that its phenomena are more easily observed, not less simple, and perhaps not less common, than those which attend the inflamed state of other tissues. This is a good reason for beginning the order of inflammatory diseases with this family; and as I am not aware of any reasons which would induce me to prefer commencing with the inflammations of any other order of tissues, I shall without further preface begin with the examination of those phenomena which are said to characterise the process of inflammation when seated in the skin.

Dr Cullen was perhaps the first pathologist who gave any

correct ideas of cutaneous inflammation, and distinguished it with accuracy from the other inflammatory affections. His *Phlegmone* and *Erythema* were intended to designate two forms of cutaneous inflammation, according as the vessels of the internal surface or those of the external surface of the membrane were the seat of the diseased action. The distinction was judicious, but it was overlooked; and those who confided in his practical instructions without attending to the correctness of the pathological distinctions, or the fidelity of his descriptive histories, transferred the seat of phlegmon from the skin, to which its author restricted it, to the cellular membrane, where it has since remained. This error was much abetted by John Hunter and Dr Carmichael Smyth, whose distinctions of inflammation, according to the tissues in which it occurs, place the Rose in the skin, and the Phlegmon or Boil in the cellular membrane. The complete analytical anatomy of the animal tissues, which was afterwards published by Bichat, did much to confirm these views; and the skin was said, whether it was believed or not, to be susceptible of inflammation in one mode only,—that of *Erythema* or Rose. This doctrine may not be altogether incorrect, if the term inflammation be limited in the manner in which this distinction implies; but while, on the one hand, this limitation is both inconvenient and unnatural, I think that both the ordinary doctrines, and the nomenclature of this part of pathology require to be again examined, and in some respects altered. It is, therefore, my purpose at present to make certain distinctions, which may both simplify, and render more precise the pathological principles of this part of medicine.

The pathology of the ancient physicians, which was very fanciful, appears to have considered many, if not all, the cutaneous inflammations, as a process analogous in some respect to the growth of a vegetable; hence the origin of the terms *exanthema* and efflorescence. In some circumstances, where the suddenness of their formation was a conspicuous feature in their history, or where they were accounted the result of a bad humour lurking in some internal part of the body, they were believed to break or burst out on the skin, and were thence named outbreakings or eruptions. In the same sense must we explain the vernacular term of *outstriking*, and its counterpart (aus-schlag) by the Germans, which is so frequently used to denote a cutaneous affection among the uneducated of our country.

These peculiarities I should not notice, did I not conceive that they have tended to obscure the nature of cutaneous inflammations, in other respects sufficiently obvious; and if it did not appear to me that they ought no longer if possible to be retained in medical nomenclature, or if retained, that every means should be used to prevent any ideas from being associated with them which would tend to bias the correct and true state of the facts. I think that all cutaneous eruptions, as they have been named, ought to be considered as merely different forms which inflammation may assume in the skin; and I trust that the manner in which I shall deliver the history of these diseases, and the mode in which they may be shown to be allied, will completely establish the justice of these opinions.

It does not appear that it is consistent with the phenomena of disease in any tissue to consider the skin incapable of any other inflammatory state than that of the erysipelatous. This is certainly one modification of the state, and perhaps a very frequent and common one; but it is quite certain that this morbid state may be developed in several other forms, and that this variety of action depends on a peculiarity of its own, or sometimes on the particular part of the cutaneous tissue which is affected. When a pimple or vesicle is formed, it cannot be doubted that the inflammatory action is at once a cause and part of the process; and every pustule and tubercle must be viewed as either co-existing with, or succeeding to inflammation. I do not think it requisite to start the question, whether the inflammation is the uniform cause of these appearances on the skin; though I believe, that, if examined, it would not invalidate or contradict the statement thus made. It is sufficient for my purpose at present to say, that, under ordinary circumstances, the process of inflammation, such as it is described by medical observers, can in general be recognized as a very important and necessary element in the phenomena of cutaneous eruptions. Finally, I believe it must be so obvious as not to require any elaborate proof, that rashes, pimples, vesicles, pustules, &c. are only various modes in which the skin may be inflamed.

Cutaneous inflammation, though it eventually affect the entire substance of the corion, may, however, be distinguished in the following manner. *First*, it may be seated in the exterior or cuticular surface of the corion; *secondly*, it may be

found round the *papillæ* or minute elevations of the corion; *thirdly*, it may affect the substance of the corion; *fourthly*, it may occur at the inner or attached surface of the corion.

The inflammation of the outer surface of the corion may be of three kinds; it may be spreading and continuous, as in *Erythema*, *Erysipelas*, &c.; it may be diffuse and interrupted, or of a determinate figure, as in Measles, or diffuse and continuous, as in Scarlet Fever. Other distinctions might be made of the mode in which this inflammation appears, of the course which it follows, and the manner in which it terminates. The redness with which the superficial cutaneous inflammation is attended is of different kinds; it always disappears on pressure, but returns immediately. In Scarlet Fever its colour is indicated in some measure by the name, but it very often has a tinge of brown; in *Erythema* or simple Rash it is seldom so vivid as in the other cutaneous inflammations; in Rose it has a tinge of yellow. In measles it is of a determinate figure; in simple rash it terminates gradually in the sound skin; in one variety of this rash (*erythema marginatum* of Willan,) and in rose (*erysipelas*,) it is always marked by a distinctly circumscribed edge, or is said to be *marginate*. Superficial cutaneous inflammation is not always accompanied with swelling; but when swelling is present, it is rather a general distension than an obvious elevation, as occurs most usually in the face, in Measles, and Scarlet or Rash-fever. When the elevation is such as to be obvious to the eye or felt by the finger, and is at the same time confined to definite patches of redness, these patches are named wheals. A familiar instance of this may be noticed in the effect produced on the skin by the bite of several insects, by the blow of a whip, or the stinging of the nettle. In the large scale it is seen in the disease named Nettle-Rash.

In Rose an elevation of this kind, but more extensive and continuous, is uniformly observed, and should be looked for as a diagnostic symptom of the disease; it is conterminous with the redness, and, like it, is marked by a distinctly circumscribed edge. Superficial cutaneous inflammation always destroys, to a greater or less extent, the scarf-skin of that part of the corion which it attacks; in such circumstances the scarf-skin comes away in small portions or scales, sometimes in larger pieces, while at the same time a new but much thinner and more transparent scarf-skin is found beneath it. This is what

has been named termination in desquamation, which is indeed a species of resolution. The process by which the changes take place do not seem to have attracted much notice; but in general I have remarked in favourable circumstances the following. The outer surface of the corion, which in health seems to secrete the cuticle in successive layers, first fluid or semifluid, and then becoming more hard, becomes so much deranged in its vascular and exhalant functions, that this is no longer practicable; the connection between the outer or secreting surface and the part last secreted is dissolved, and, as the disease goes on, no new healthy cuticle is formed. As, however, the morbid action gradually subsides, the secreting property of the corion returns to its healthy state, and new but more delicate cuticle is again prepared, the growth or appearance of which facilitates and accelerates the removal of the old cuticle. Such very nearly seems to be the course of events in measles, scarlet-fever, nettle-rash, rose-rash, common rash, and rose, when it does not proceed to the formation of Blebs.

In the last case a different process is observed; the morbid action is not terminated by resolution, but the outer surface of the skin, after being sometime inflamed, pours forth a thin watery fluid, which detaches the cuticle from it, and elevates it in the form of a Push, Bleb, or Blister (*Bulla*). The form of these blebs is not determinate, and even in their appearance they are not always uniform. The action by which they are produced seems to be only more violent in degree, but not different in kind, from the ordinary cutaneous inflammation; it is certainly attended with a more exquisite burning heat, with more swelling of the corion, and a more acute and burning pain than the other forms of superficial cutaneous inflammation. The considerations and facts, indeed, which we have now noticed, would lead to the following conclusion, that the *Erythema* or simple rash is the mildest,—that producing the wheal the next,—and that producing the push or bleb the most violent degree of this inflammation. In the first there is mere redness and heat without swelling of the corion, and these states go off without any other injury than desquamation of the scarf-skin. In the second, the redness and heat are combined with tingling pain, and considerable, at least, obvious swelling, which, however, terminates by resolution, at least in ordinary cases, and desquamation of the scarf-skin. In the third, besides redness, the

heat and pain are intense, the swelling well-marked, and the ordinary termination is in the effusion of a fluid which removes the cuticle from the corion.

Such are the chief general phenomena attending the inflamed state of the outer or cuticular surface of the corion. The others, of more peculiar nature and less importance, I shall notice when I treat of the individual inflammations.

In some cutaneous inflammations the morbid action seems to be seated exclusively in the orbicular or conical eminences denominated *papillæ*. These bodies become red, swell and raise the cuticle over them, and seem in this manner to give rise to the elevations named pimples. Such seems to be the state of the skin in *Strophulus*, *Lichen*, and *Prurigo*, and some other eruptions which take place when the system is affected with *Syphilis*. They never pass into suppuration, and after the removal of the cuticle which covered them, they seem to resume their natural condition.

Inflammation of the skin, instead of the spreading and superficial form, may be developed in a circumscribed manner in an infinity of minute points. These may either be confined to the outer surface of the corion without affecting its substance,—or may begin originally in the corial surface, and proceed thence to affect the substance of that membrane,—or, in short, commencing in the corial substance, may ultimately produce the same phenomena which take place when it commences on the surface. In the first case, when the corial surface is affected with inflammation occurring in many minute points, when the morbid process has subsisted for 12, 20, or even 30 hours, a thin fluid is poured out, generally transparent, sometimes slightly opaque, but never so much so as true purulent matter. This fluid was named by Drs Willan and Bateman *lymph*, and the circumscribed or individual inflamed points were called *vesicles*. It is certainly not the same as the coagulable lymph of Mr Hunter, and appears to be a fluid quite similar to what is secreted in the first stage of suppuration. The individual points appear first like a common rash, sometimes like pimples, with a good deal of redness surrounding them; after some hours a white pearly point appears on their summits, and the surrounding redness diminishes so as to appear like a mere circle or hoop; this is what is named an *areola*; after 12, 20, 30 hours or more, according to circumstances, the white pearly

appearance extends, becomes slightly yellow, is depressed on the same summit, and in the course of two or three days a thin crust or scab is thrown off, which consists of the cuticle of the part with the dried fluid adhering to it. The vesicles seldom leave any mark on the corion, which shows that the substance of this membrane is not much affected. Drs Willan and Bateman have considered them as quite distinct from the objects produced by the next action; but they appear to differ only in degree, and to be merely an earlier or less perfectly formed pustule (*vide* below.) Vesicles are observed in the Chicken-pox, Millet-rash, Shingles, the Mercurial-rash, and perhaps some others. When the morbid fluid secreted by the inflamed teat of the cow is applied to the human skin in proper circumstances, it produces at each point to which it is applied, a flat vesicle of a circular figure, which is found on examination to consist of several separate cells or partitions. The diseased action in this instance, though originating in the outer surface of the corion, generally affects the corial substance so much as to produce considerable loss of substance, and leave an obvious scar.

It is convenient to notice in this place, though pertaining to another kind of inflammations, that elevations similar to vesicles are not confined to the skin, but are found also in the mucous or villous membranes, and on those spots at which they are connected with the skin. The vesicular elevations, in such circumstances, are named *Aphthæ* (Thrush-eruptions.)

Inflammation of the minute circumscribed kind, though commencing in the outer surface of the corion, appears sometimes in its progress to affect the substance of the corion. A very good example of this fact is found in that which has been already stated regarding the vaccine vesicle. The matter applied simply to the cuticular surface of the corion quickly induces the ordinary appearances of inflammation; the point swells, is surrounded with a narrow red border, which afterwards becomes more extensive; a fluid is secreted at first almost pellucid, afterwards more opaque and probably thicker; as the process goes on, the corion not only secretes this fluid, but is in part affected with the ulcerative absorption; and when the scab drops off, an indelible scar generally remains. The same course of phenomena appears to take place in the inflammation attending the Limpet-shell-scab (*Rupia*,) and perhaps in some of the cuta-

neous inflammations generated by the application of the poison of small-pox.

These facts show that it is impossible to draw a distinct line between the vesicle and the pustule ; and it is more natural to consider them as gliding into each other, than as always capable of being distinguished. What is a vesicle at its first appearance will perhaps assume the character of a pustule on the following day, and the thin fluid which has been supposed to characterize them will be converted into purulent matter before the disease has terminated. As, however, the terms are useful as precise distinctions in nomenclature and description, and as they may occasionally be traced to a pathological distinction, I shall still keep them in view in the following observations.

Inflammation of the minute circumscribed kind appears in many instances to commence originally in the substance of the corion, and in its progress to be attended with the formation of purulent matter. Bichat, indeed, asserts that the corion is itself insusceptible of the acute inflammation, and thinks that all these forms of disease are seated either at its surface, or in the cellular tissue of its areolæ. But it may be doubted whether his observation of these phenomena was sufficiently extensive to warrant this assertion. The objects formed in this manner are named *pustules*, and they are to be viewed as instances of true phlegmonous inflammation of the skin. I have enumerated five forms under which this species of cutaneous inflammation may take place ;—1st, *Psudracium* ; 2d, the *Achor* ; 3d, the *Favus* ; 4th, the *Phlyctidium* ; and 5th, the *Phlyzacium*.

The *Psudracium* may be viewed as the connecting link between the vesicle and pustule. It is small, often irregularly circumscribed, producing but a slight elevation of the cuticle, and terminating in a laminated scab. It is attended with little or no redness of the surrounding skin (*areola*,) does not affect the corion deeply, and rarely, almost never, leaves a hollow scar. Several of them often appear together, and becoming confluent, after discharging the scanty puriform matter which they furnish, pour out a thin watery fluid, which, on drying, forms an irregular incrustation.

The *Achor* does not differ much from the *psudracium* ; it ap-

pears in the form of a minute pointed elevation,—of a yellow colour, and succeeded by a thin, brown or yellowish scab ; it is found to contain a straw-coloured matter of the appearance and consistence of strained honey ; it is surrounded with little inflammatory redness, and seems to affect the corion as little as the *psyradium* ; in ordinary circumstances it leaves no scar.

The *Favus* may be esteemed the next degree of inflammation of this kind. It is larger and flatter than the last-mentioned pustule, not pointed, and contains a more viscid matter than the *achor*. It is surrounded by a slightly red marginal ring, which is often irregular,—circumstances which seem to indicate a more considerable affection of the corial tissue. It is succeeded by a yellow, semitransparent, and sometimes cellular scab-like honey-comb.

The *Phlyctidium*, or genuine small-pox pustule, consists in a circular or annular spot of inflammation of the corion, encircled by a red ring or zone, which is observed to consist of the outer corial surface highly vascular and elevated. Within this elevated border suppuration takes place. Though the *phlyctidium* is observed spontaneously in the distinct small-pox, it is also produced artificially by friction with tartar-emetic ointment.

The *Phlyzacium* is the most perfect example, and the most violent degree of this form of cutaneous inflammation. It is described as a large pustule raised on a hard circular base, of a lively red colour, and succeeded by a thick, hard, dark-coloured scab. It is generally slow in progress, and commencing in the substance of the corion, is attended with considerable surrounding inflammation ; and the suppurative process which follows is always attended with more or less destruction of the corial tissue. It often leaves a hollow scar. The surrounding redness, hardness, and elevation, the slow progress, and sometimes tedious suppuration, and lastly, the loss of corial substance, are the circumstances which point out the peculiar seat of this form of cutaneous inflammation.

One form of cutaneous inflammation, which appears to originate in the substance of the corion, is very slow in progress, not attended with much pain, redness, or heat, but considerable hard swelling ; it undergoes but an imperfect or partial suppuration, which does not entirely remove the hardness or swelling, and which is liable to take place again, or even several times, before the inflammatory action has quite subsided.

Drs Willan and Bateman named the individual points in which this inflammation occurred *tubercles* ; but under this name they associated forms of cutaneous disease too numerous, and too different, and unlike.

Some of the forms of Cutaneous Inflammation referred to this head are of the character of chronic *phlyzacia* ; others appear to depend on inflammation of the sebaceous follicles ; others on inflammation of the corial follicles ; and others on inflammation and suppuration of the piliparous sacs, and consequent ejection of the hairs by their root.

While the general character of the eruptions now specified is that of chronicity, or slow and tedious progress, they are always connected with imperfect circulation and impaired secretion of the skin, and not unfrequently of the mucous surfaces, or some of the organs connected with those surfaces.

Of several of these eruptive disorders, it is a common character, that they are the effect of some morbid poison, as that of the venereal disease, or some similar specific taint, operating, in general, on a constitution enfeebled by debauchery, or repeated courses of mercury, bad food, or similar deleterious agents. Here, however, I am departing from strict description, and entering upon the subject of causes,—which belongs to a subsequent head.

Inflammation of the interior attached surface of the corion is perhaps, taken by itself, a rare occurrence, as it seems generally to take place at the same time with, or in consequence of, inflammation of the subjacent cellular tissue. I have already stated, that, according to Dr Cullen, pure inflammation of the inner cutaneous surface gave rise to the phenomena by which he has characterized the phlegmon.—(First Lines, Vol. i. p. 275.) It would be as well to restrict the signification of the term in this manner, if we were not thus deprived of an appropriate epithet to designate the inflamed state of the cellular tissue ; and were it not that, according to the views of more recent pathologists, the symptoms of the phlegmon have been almost universally derived from the observation of the inflamed state of the cellular tissue. From this difficulty, however, we may in some degree extricate ourselves, by the reflection, that one term has been long in use to denote inflammatory phenomena, which pathology informs are seated very nearly, if not altogether exclusively, in the inner surface and substance

of the skin. The tumour named Boil or Furuncle is certainly confined to the corion in its action ; it begins apparently at the inner surface, and, equally remote from the inflammation of the subcutaneous cellular tissue in its slow progress and imperfect, crude, and blood-coloured suppuration, and from the ordinary pustule, by its deeper site, and broader hold of the corion, it proceeds to affect the corial substance, until it has reached the opposite or cuticular surface, where its scanty matter is discharged by one or more openings. This, however, is not the only peculiarity of this form of cutaneous inflammation. According to Bichat, the furuncular action differs from every other by affecting exclusively the cellular tissue, which enters into the composition of the corion, and fills the *areolæ* of that membrane. “ In boils,” says this author, “ I have observed, that whatever fills the intervals of the dermoid fibres disappears by suppuration, and that these fibres, separated also by the swelling of the part, truly present the kind of sieve of which I have already spoken, when the fluid which moistens them is removed by washing. The boil, indeed, differs from a multitude of other cutaneous eruptions in this, that it attacks the cellular tissue of the corial areolæ.”—(Anat. Gen., Vol. iv. p. 687.) I am unable to say how far this doctrine is correct, and this is scarcely the proper place to inquire into its truth ; but it is obvious that almost all the inflammations similar to the boil commence either at a great depth, or at the inner surface of the corion, and that this may be adduced as a familiar instance of the kind of cutaneous inflammation at present under consideration.

Lastly, Certain forms of cutaneous inflammation either commence at once in the two surfaces and substance of the corion, or at least affect them so simultaneously, that it becomes impracticable to distinguish them otherwise, than as inflammations affecting the whole corion or its substance. These are most commonly seen in certain chronic distempers of the skin, in which there is also more or less disorder of the mucous and fibro-mucous membranes.

§ II. GENERAL ETIOLOGY OF CUTANEOUS INFLAMMATIONS.—It may be considered almost superfluous to inquire what are the causes concerned in the production of cutaneous inflammation, since it seems reasonable to think that causes productive of inflammation in general may, under certain circumstances,

induce inflammation of the skin. Though this is undeniable, it is, nevertheless, certain that the attentive observer recognizes some peculiar circumstances in the production of Cutaneous Inflammation. I shall attempt to give a short view of the facts ascertained by observation and experience.

In the *first* place, it is observed, that any of the ordinary causes which produce strong or injurious impressions on the skin or its parts give rise to inflammation of that membrane. Thus scratches, stings of insects, bruises, punctures, burns, wounds, and similar injuries, are followed by cutaneous inflammation, sometimes erythematous, sometimes erysipelatous, occasionally phlegmonous. Upon the same principle, exposure to excessive cold, as that of the east wind, snow, or cold rain, and exposure to extreme heat, are equally liable to be followed by cutaneous inflammation.

Secondly, The appearance of certain inflammations of the skin is manifestly connected with various acute disorders of the mucous surface of the alimentary canal. Thus, disorder of the stomach or bowels in infants may be followed by the papular inflammation of *Strophulus*, and in adults by *Erythema*, *Rose*, and various other eruptions.

Thirdly, All the acute cutaneous inflammations, or eruptions, as they are denominated, are connected in their origin with affection, more or less intense, of one or more of the mucous membranes. Thus Measles are connected with catarrh and bronchial inflammation; Scarlet-Fever, with more or less affection of the gastro-enteric mucous membrane, sometimes the bronchial, and not unfrequently the genito-urinary; *Rose*, *Nettle-Rash*, *Shingles*, with the gastric mucous membrane; *Miliary Fever*, with the pulmonary and gastric mucous membrane; *Small-pox*, with the gastric and bronchial or laryngo-bronchial mucous membrane.

Fourthly, In all the chronic eruptions, without exception, one of the two following circumstances may be recognized,—
1. Previous to the appearance of the disorder of the skin, whatever be its form, the patient complains of more or less uneasiness, and there is more or less disorder of the functions of digestion, circulation, nutrition and secretion, sometimes very considerable. The skin is dry, and irregularly hot and cold; pains are felt in the head, back, and limbs, sometimes in the chest, sides, and epigastric and umbilical regions; the pulse is

a little more frequent than natural ; the appetite is impaired ; the tongue is furred ; and, with thirst and heat, there is a clammy sensation of the mouth and throat. At the same time the bowels are slow, often with a sense of fulness in the hypochondriac or umbilical region, and the urine is scanty or high-coloured. In females the menstruation is painful, irregular, attended with whites, or liable to suppression. When the eruption is established, most of these symptoms subside. But there remain symptoms of imperfect digestion, and deranged cutaneous and mucous secretion. 2. In other instances, though the marks of general disorder are abated on the appearance of the eruption, as that proceeds, they again undergo some aggravation, and the marks of impaired digestion and nutrition, and deranged circulation and secretion, may acquire a very serious character, with considerable wasting of the flesh, loss of sleep, and general feebleness.

Fifthly, From the facts now specified, it must result that inflammatory diseases of the skin, whether acute or chronic, are not to be viewed as exclusive affections of the cutaneous tissue, but are to be regarded as disorders either affecting the skin after a previous affection of the mucous membranes by a species of metastatic action, or affecting, at the same time, more or fewer of the mucous membranes and the skin, in consequence of the operation of the same general cause or causes.

Sixthly, While it is a fact established by multiplied observation, that there is a close physiological connection between the skin and the mucous membranes, and that the healthy state of the circulation and secretions of the one is closely connected with the same states of the same functions in the other,—it is not less a fact, that any derangement in the circulation and secretions of the mucous surfaces, and of that of the alimentary canal, is liable to be accompanied with correspondent derangement in the circulation and secretions of the cutaneous tissue. On this point I refer to the ingenious Dissertation of Welt, who has, with infinite patience and learning, collected from different sources the various facts illustrative of the principle now specified. (*De Exanthematum Fonte Abdominali*, Goettingæ, 1784.)

Seventhly, Though these derangements in the circulation and secretions of the skin may occur in any class of persons, and under any circumstances of derangement of the circulation and secretion of the mucous surfaces, they are much more likely to

take place in cases in which there are evident marks of an enfeebled state of the capillary vessels of the skin,—as indicated by imperfection or irregularity in the cutaneous secretion, facility of being suppressed under the operation of slight causes, and occasionally of being augmented to excess. It is hence that persons liable to catarrhal affections and gastric disorders are also the most frequent sufferers from cutaneous eruptions.

Eighthly, Though the physiological and pathological connection between the skin and the mucous membranes is certainly the most common, several facts indicate that a similar connection may, in certain constitutions, subsist between the skin and various internal organs, for instance, the brain, the lungs, the heart, the liver, and even the womb, whether this connection be maintained directly between the skin and the organs now mentioned, or indirectly, by the interposition of the gastro-enteric mucous surface. Thus, repelled cutaneous eruptions have been known to produce meningeal inflammation, with *delirium* and *mania*. Long-continued coughs, with dyspnœa, have been observed to disappear on the establishment of cutaneous eruptions; obstinate palpitation has been found to subside in the same manner; and various disorders of the uterine system have been found to resist all remedies, till the accidental or artificial production of cutaneous inflammation. It must indeed, be admitted, that, in the second and fourth cases, the facts do not indicate more than the affection of the mucous and submucous tissues; and even the third case might be explained without assuming a connection between the skin and the heart. The case of the brain and its membranes is less equivocal; and must either be referred to the direct, or the indirect, communication already mentioned. On this point I may refer to the elaborate and instructive Dissertation of John Henry Rahn, who has examined the connection between the brain and its membranes, and the abdominal *viscera*, with a degree of learning and ingenuity not yet surpassed. (*De Miro inter Caput et Viscera Abdominis Commercio*, Goettingæ, 1771.)

§. III. GENERAL THERAPEUTICS OF CUTANEOUS INFLAMMATIONS.—The facts and arguments now adduced will tend to throw some light on the general therapeutic principles by which the treatment of cutaneous inflammations should be regulated. The general deductions may be stated in the following manner.

In every cutaneous inflammation it is necessary to inquire

into the state of the circulation and secretions of the alimentary canal and its appendages, especially the liver and spleen, and to employ such remedies as may bring them into a proper state. It is necessary also to consider the condition of the cerebro-meningeal circulation in both sexes, and of the *uterus* and ovaries in the female. It is further requisite to look to the state of the bronchial membrane and lungs, and the heart. And it is particularly requisite to remember that certain eruptions run a definite course, and that the chief duty of the physician is to cause this to be completed in the easiest manner possible.

It is also of great moment to equalize the cutaneous circulation, and to employ those remedies which may have the effect of both giving vigour to the capillaries of the skin, and of exciting their vessels to perform the function of secretion with regularity and efficiency.

In proceeding to consider the inflammatory diseases of the skin individually, the great purpose is a natural and perspicuous division. The arrangements of the professed nosological authors I presume to be well known ; those of the writers who have treated of cutaneous diseases in particular, are perhaps, if we except Willan, not much known in this country. The last, which was imitated from Plenck, has been almost consecrated by the accurate description and beautiful delineations with which our two countrymen have elucidated the subject. The arrangement, however, is too artificial in attempting to render a very accurate and precise nomenclature the foundation of their nosological distinctions. The great work of M. Alibert, though defective in the want of this precision and accuracy of distinction, is, however, extremely valuable as a work for consultation, by its minute description and its magnificent delineations. The arrangement given by Pinel in his philosophic nosography is not only confused but defective in its individual parts, and is not founded on any principle whatever which we can recognize. More recently, Dr Good has attempted another, founded chiefly on the distinctions and divisions of Dr Willan ; but it may be doubted whether it is very natural to separate, as he has done, those cutaneous affections which he thinks depend on alteration in the discerning power of the skin from the others, which are more distinctly inflammatory ; and I deem it erroneous to separate diseases of the same tissue,

which differ only in degree, or in the length of time which they take to perform their full process.

The recent work of M. Rayer, though embracing the whole subject of cutaneous diseases, is chiefly a practical exposition of, and commentary on, the system of Willan and Bateman; and the new edition of M. Alibert, though containing much useful matter, is nevertheless highly objectionable, by reason of its capricious and fanciful method of arrangement.

These circumstances, which show that the great objections to the arrangement hitherto made known, are chiefly those which arise from divisions, artificial, forced, or arbitrary, have led me to bestow some attention on the subject, and to dwell especially on those characters by which a natural alliance between the cutaneous inflammations, if it actually exist, may be preserved;—and if it appear that I occasionally deviate from this principle, I wish it to be understood that I do so for the sake of communicating information more correctly than could be otherwise done, and in a form more likely to be readily comprehended by my readers.

With this view, I regard it most expedient to arrange the cutaneous inflammations, according to the part of the skin in which they are specially seated, according to the mode in which the inflammatory action proceeds, and according to the effects which it produces, in the following order:

Diffuse or Spreading Inflammation.—I. Cutaneous inflammations seated in the outer surface of the corion, and generally spreading along it.

Measles,	<i>Rubeola.</i>
Rash-Fever, Scarlet-Fever,	<i>Scarlatina.</i>
Nettle-rash,	<i>Urticaria.</i>
Rose-rash,	<i>Roseola.</i>
Common Rash,	<i>Erythema.</i>

Effusive Inflammation.—II. Cutaneous inflammation seated in the outer surface of the corion, producing a fluid which elevates and detaches the cuticle.

Rose, St Anthony's Fire,	<i>Erysipelas.</i>
Bleb Fever, Bullose Fever,	<i>Pemphigus, Febris bullosa.</i>
Simple Blebs,	<i>Pompholyx.</i>

Punctuate Papular Inflammation.—III. Cutaneous inflammations commencing in circumscribed or definite points of the corion, producing minute eminences.

Gum, Gown, Red Gum, Tooth Gum,	<i>Strophulus.</i>
Sun-Rash, Prickly Heat,	<i>Lichen.</i>
Itchy Rash,	<i>Prurigo.</i>

Punctuate Desquamating Inflammation.—IV. Cutaneous inflammations of the outer surface of the corion, more or less circumscribed, affecting its secreting power, and producing exfoliation of the cuticle.

Scaly Leprosy,	<i>Lepra.</i>
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Scaly Tetter,	<i>Psoriasis.</i>
Dandriff,	<i>Pityriasis.</i>
Fish-Skin Disease,	<i>Ichthyosis.</i>

Punctuate Vesicular Inflammation.—V. Cutaneous inflammations originally affecting the outer surface of the corion, circumscribed, definite, or punctuate, producing effusion of fluid first pellucid, afterwards slightly opaque, with elevation of cuticle, with or without further affection of the corial tissue.

Miliary Rash,	<i>Miliaria.</i>
Shingles, Vesicular Ringworm or Fret,	<i>Herpes.</i>
Heat Spots or Red-Fret,	<i>Eczema.</i>
Limpet-Shell Vesicle or Scab,	<i>Rupia.</i>
Cow-Pox Vesicle,	<i>Vaccinia.</i>
Chicken-Pox,	<i>Varicella.</i>

Punctuate Phlegmonous or Pustular Inflammation.—VI. Cutaneous inflammations originally affecting the outer surface of the corion, afterwards its substance, and producing purulent matter more or less distinct.

Small-Pox,	<i>Variola.</i>
Malignant Pustule, Persian Fire,	<i>Carbunculus ; Anthrax.</i>
Itch,	<i>Scabies.</i>
Moist or Running Tetter,	<i>Impetigo.</i>
Scall or Pustular Ringworm,	<i>Porrigo.</i>
Great Pox,	<i>Ecthyma.</i>

Punctuate Chronic Phlegmonous Inflammation.—VII. Cutaneous inflammations originating in the substance of the corion, sometimes at the bulbs of the hair, and terminating in partial or imperfect suppuration, with formation of scales, crusts, &c. and more or less destruction of the corial tissue.

Boil,	<i>Phyma, Furunculus.</i>
Whelk,	<i>Acne.</i>
Scalp or Chin Whelk,	<i>Sycosis.</i>
Canker,	<i>Lupus, noli me tangere.</i>
White Scall,	<i>Vitiligo.</i>
Yaws,	<i>Frambæsia, Rubula.</i>
Sivvens,	<i>Sibbenia.</i>

Punctuate Phlegmono-Tubercular Inflammation, Chronic.—VIII. Cutaneous inflammations, chronic, attended with general affection of the fibro-mucous tissues.

Arabian Leprosy,	<i>Elephantiasis.</i>
Arctois Leprosy, Radesyge,	<i>Lepra Norwegica.</i>
Lombard Evil, Pellagra,	<i>Pellagra.</i>
Scherlievo, Falcadina,	<i>Lepra Pedemontana.</i>
Asturian Itch or Scab, Mal di Rosa,	<i>Lepra Asturiensis.</i>
Crim Evil, Krimmische Krankheit,	<i>Lepra Taurica.</i>
Soft Tubercle,	<i>Molluscum.</i>
Wart,	<i>Verruca.</i>

SECTION I.

Cutaneous inflammations seated in the outer or cuticular surface of the corion (*cutis vera derma,*) and generally spreading along it.

This must be regarded as the simplest form of cutaneous inflammation. It may, indeed, be doubted whether it can justly be termed inflammation; for, though the capillaries of the cu-

ticular surface of the corion are undoubtedly unnaturally distended with blood, and the usual functions of secretion and perspiration are suspended, it never gives rise to those consequences which succeed the inflammatory process in other tissues, or even in the same tissue in a state of unequivocal inflammation. It may, however, be remarked, that in other respects the phenomena of the disorders referred to this head afford fair examples of inflammatory action. The skin is permanently red, either continuously or in patches, or in spots of definite figure, diffusely swelled, and unusually warm, or rather hot and dry. Its sensations are also deranged; for the parts are either painful, smarting, or itching, as in nettle-rash, rose-rash, and common rash; or the skin is generally tense and sore, as in measles and scarlet-fever. In each of these diseases also, the capillaries of the outer or cuticular surface of the corion are inordinately distended with blood, which appears to move very slowly or stand entirely motionless in them.

§. I. Measles, *Rubeola*, Sauvages and Cullen. *Morbilli*, Sydenham et Morton. Juncker, Frank. *Febris morbillosa*, Hoffman, Vogel. *Rougeole*. *Morbillo*; *morbilli*. *Rosolia*, Etruscis; *Fersa*, Bononiensibus. Die Kindsflecken. Die Masern.

Measles commence in general with the usual symptoms of fever. Sense of coldness, languor, and fatigue, are succeeded by heat, thirst, headach, anxiety, sickness, and vomiting, more or less general weakness, with quick, strong, sometimes oppressed pulse, and disordered respiration and secretion. At the same time other symptoms occur which denote an inflammatory state of the nasal and bronchial mucous membrane. (Badham on Bronchitis, p. 66.) The eyelids are red and swelled, the eyes red and tender, with considerable lacrymation, sneezing, and a sense of soreness in the nostrils; hoarseness, short dry cough, quick and sometimes difficult breathing succeed; and constant drowsiness, sometimes with fits of raving, especially in the night, are very general complaints for the first two or three days. On the fourth day from the commencement of these symptoms the rash appears; but has been observed so early as the third, and so late as the fifth and sixth; irregularities, which, though not easily explained, must be noticed and remembered.

The order of its disappearance is in general,—the forehead,

chin, and rest of the countenance, on the morning of the fourth day; the neck and breast on the morning of the fifth, and towards evening the whole trunk; lastly, the extremities either the same evening or the following morning. On the face it appears in small red points, which soon after form clusters or continuous patches, not visibly elevated, but to the touch somewhat rough and prominent. At the same time the face is diffusely and generally swollen, and sometimes in the vicinity of the eyes this is so considerable as to close the eyelids for a day or two. This circumstance often renders it difficult to distinguish the figure of the red spots or patches; but this may be easily done on the trunk and extremities. Dr Willan was the first who observed the determinate figure of the measles-rash, and showed that they approached very nearly to a crescentic or semicircular shape;—a circumstance which may generally be employed with great certainty as a diagnostic mark. No roughness or elevation can be recognized in the eruption on the person; but it is by no means unusual to observe miliary vesicles on the neck, breast, flexures of the arms, and other points of the anterior cutaneous surface, and minute pimples on the wrist, hands, and fingers.

On the fifth day the efflorescence on the face is most vivid; but on the sixth it begins to fade or become brown, while the patches on the body are bright-red. On the seventh these also begin to fade, and those of the extremities, which appear latest, generally fade and disappear about the eighth day. On the ninth day from the first accession of symptoms, the observer can recognize only slight patches of discoloration, which vanish before the end of the tenth, while the skin is in general covered with a mealy desquamation.

When the rash appears on the fourth day, the symptoms of catarrh, or bronchial inflammation, are generally augmented, and not unfrequently undergo little or no abatement after its eruption. If they subside, it indicates a mild disease, which, in general, will terminate by spontaneous resolution; and a loose state of the bowels (diarrhœa) supervenes, and contributes to relieve the symptoms of fever and inflammation. In such circumstances, the disease generally terminates favourably about the ninth or tenth day; and convalescence follows.

It is not always, however, that Measles are terminated in this simple manner, and leave no trace of their existence.

Practical authors have remarked, that they are often followed by other inflammatory affections, especially, ophthalmy, consumption, scrofula, &c. I believe that all these sequelæ, as they have been named, are to be viewed as the result of the general inflammation of a very extensive mucous surface. Previous to, and at the same time with, the rash, the whole villous surface of the eyes, internal ear, nostrils, windpipe, and bronchial tubes, is much inflamed, as the symptoms above enumerated and dissection of fatal cases demonstrate. In some cases, this inflammation of the bronchial membrane may be so violent as to affect the pulmonic tissue, and prove fatal at an early period of the disease by suffocation. If this do not take place, and if the inflammatory action be not spontaneously resolved, or obviated by means of art, it may at particular points proceed to hemorrhage, effusion, suppuration, or other disorganizing processes. The particular region or organ in which these changes take place will depend on circumstances, which cannot always be well distinguished. In one patient, the tympanal cavity and its minute bones will be injured, causing a discharge from the ear, and more or less deafness for life. In another, the eyes will be most affected, and long and tedious chronic inflammation of the eyelids will be induced. In a third, swellings of the lymphatic glands of the neck, or other regions, will be the prominent injury. The inflamed state of the bronchial membrane has been known in other cases to terminate in pulmonic inflammation and suppuration, spitting of blood (*hæmoptysis*,) water of the chest (*hydrothorax*,) or chronic inflammation of the pleura (*empyema*,) or to lay the foundation of tubercular or other pulmonic disease, which has finally terminated the existence of the patient. Sometimes the Mucous follicles of the Ileum become inflamed and ulcerate, causing chronic diarrhœa, the mesenteric glands become diseased, and *Marasmus* ensues; in others, chronic eruptions on the skin, as *Ecthyma*, *Rupia*, *Herpes*, &c. with porriginous pustules, are the consequences of the disease. These various effects have been named, both by physicians and the vulgar, the dregs of the measles, and are justly the subject of apprehension as intractable complaints.

It sometimes happens that the measles-rash is observed to affect some individuals during an epidemic, but without being attended with the watery eyes, sneezing, hoarseness, and cough, or even fever after the eruption. To this form Willan applied the denomination of Measles without catarrh (*Rubeola*

sine catarrho.) Persons who have passed through this eruption are still susceptible of the disease in its ordinary form, and with the usual accompaniments. It is probably in this way that measles may affect the same individual twice in the course of life.*

Practical authors have mentioned measles with what they termed a putrid or malignant tendency prevailing epidemically. Morton, for instance, notices the putrid measles in London in the year 1672; Huxham represents them to have been prevalent at Plymouth in 1745; and Dr William Watson describes, in the fourth volume of the Medical Observations and Inquiries, an epidemic of malignant measles at London in 1763 and 1768. From the history of the disease, and the account of several dissections, it is evident that the malignity arose from the interruption of the functions of the lungs, or the effects which naturally accompany imperfect respiration. The symptoms of inflammation of the nasal and bronchial mucous membrane were distinct and urgent, while the eruption was faint, or had disappeared. "The watery eyes were turned into grievous soreness of the organ, which lasted a considerable time; the cough, oppression, and difficulty of breathing, were equally severe, or more so than during the eruption, and were attended with great restlessness and anxiety, without any expectoration. The pulse was quick and irregular, and the weakness was extreme."—"Of those who died, some sunk under laborious respiration, more from a dysenteric purging, the disease having attacked the bowels; and of these one died of mortification of the rectum. Six died sphacelated in one or more parts of the body. The girls most usually became mortified about the *pudenda*. In two, ulcers in the mouth and cheek caused such ravages that the cheek, from the ulcers within, sphacelated externally before they died. Of these, one had the gums and jaw-bone corroded to so great a degree, that most of the teeth on one side came out before she died. The lips and mouths of many who recovered were ulcerated, and continued so for a long time. Besides these, after the cough, difficulty of breathing, and other seemingly threatening symptoms, were gone, several were so debilitated that they refused to take almost any nourishment, and sank quite emaciated; one so late as six weeks after the attack.

* Dr Baillie's Account of several persons who have had Measles, in Medical and Chirurgical Transactions, Vol. iii. p. 258 and 263.

“ Several were opened who died under different circumstances attending this disease ; of some, who died of laborious respiration, after the feverish heat and eruptions were passed, the bronchial system was found very little loaded with mucus ; but the substance of the lungs was tender, and their blood-vessels were very much distended and obstructed.

“ In a girl, who died on the nineteenth day of laborious respiration and extreme debility, many strong adhesions were found between the lungs and pleura. The lungs were distended with blood, and the left lobe had begun to sphacelate. Part of the jejunum was much inflamed, and contained several worms.

“ Another died at the end of three weeks, during which time his breathing had been difficult ; for several days he had had a colliquative purging ; but when he was apparently no worse than he had been for some days before, he died suddenly. He had complained much of a sharp pain under the left scapula. Upon opening the thorax, the blood-vessels of the lungs were found much enlarged, and a sphacelus of considerable extent in the left lobe. This, by corroding the blood-vessels, occasioned an hemorrhage, which filled almost the left cavity of the chest. The sphacelated part of the lungs contained a considerable quantity of putrid, dark-coloured, highly offensive sanies. Collections of purulent matter were found in none ; on the contrary, in this putrid disease, every morbid appearance indicated a sphacelus.”

From this description, it may be justly inferred, that the symptoms conceived to denote putridity consisted principally in a more serious affection of the bronchial membrane, the pulmonic substance, and the internal capillary circulation in general, with a tendency to erysipelatous or gangrenous inflammation of the skin and certain regions of the mucous surfaces. The recession of the rash from the surface, the oppressed breathing, anxiety, and extreme weakness, show that the blood had retired in a great degree from the surface, and accumulated in the blood-vessels and capillary system of the lungs. The dark and livid colour of these organs after death, which Dr W. Watson has erroneously considered as marks of mortification, are proofs of the same state. With regard to the dysenteric affection, it is not unlikely that a similar state of the capillaries of the intestinal mucous membrane occurred in many cases, and was merely a more violent degree

of that action which takes place spontaneously in the ordinary form of measles. The marks of mortification about the mouth, cheeks, and *pudenda*, appear to be ultimate effects of the exhaustion and weakness resulting from the long continuance of violent capillary disorder. This disease, indeed, consists chiefly in an accumulation or congestion of imperfectly respired blood in the capillaries of the internal organs, and is not unlike in its pathological relations to the state of fever denominated *congestive*.

In the treatment of Measles, the principal duty of the physician is to conduct the patient through the disease so as to prevent or obviate injury of the lungs or the bronchial membrane. The disease must run a given course, and undergoes a natural solution on finishing that course. The chief danger consists in the intensity of the bronchial or pulmonary inflammation; and with the view of obviating or moderating this, blood-letting, general and local, with the antiphlogistic regimen, are the most effective measures, and must be employed more or less promptly and energetically, according to the symptoms.

Dr Heberden, indeed, contends, that "bleeding, together with such medicines as the occasional symptoms require in any other fever, is the whole of the medical care requisite in measles." Dr Willan has placed this matter in the most judicious view. Oppressed breathing, with laborious pulse, on the first or second day of the eruption, is common to other eruptive fevers, and usually disappears in the course of twenty-four hours. When, therefore, it is not accompanied by hard cough, and pains in the breast or side, it may be left to the natural termination, even in adults. But, on the other hand, when the eruption has disappeared, and these symptoms, with difficult breathing, become severe, bleeding, either from the arm or by leeches, or cupping from the chest, may be repeatedly necessary. Its effects will be aided by blisters and diluent liquors, or toast-water, barley-water, linseed-tea, and lemonade.

To moderate the cough, which is generally troublesome and painful, opiates, when they can be safely employed, are most effectual. In measles, in which the inflammatory state is considerable, opiates have been believed to be detrimental, by increasing heat and checking secretion. This, however, is chiefly in the early stage of the disease, while inflammation is commencing, and while the febrile symptoms are intense. In the ad-

vanced stage, when the symptoms are either declining spontaneously, or, after due blood-letting, opiates are beneficial; and in almost all stages the injurious effects attributed to the use of these remedies may be counteracted by the use of antimonials. In all the cutaneous inflammations there is great irritation, anxiety, and restlessness; and these effects are most safely and effectually obviated by the judicious and seasonable administration of opiates.

Another means of diminishing the anxiety and restlessness resulting from the cutaneous irritation is to lower the temperature of the patient's apartment as much as is consistent with safety. It is supposed that the bronchial affection bears cool air much less safely than other eruptive diseases, and that external warm is beneficial in relieving internal congestion and maintaining the eruption. The great object ought to be to keep the patient cool without being cold, to prevent his apartment from being overheated, and not to expose him to direct cold currents of air. The chamber should be large, if possible, and wide; and the bed-clothes should be light.

Of late years the cold affusion has been practised by Mr Magrath of Plymouth; * but it is an unsafe remedy, unless in the hands of a very judicious and very watchful practitioner.

A much safer method of cooling the surface and abating the anxiety is by means of tepid sponging, and fomenting the feet every night or every alternate night.

The safest, and perhaps not the least useful, kind of remedies, are those which open the bowels, and maintain their regular and periodical evacuation. These are admissible at all stages of the disease; and even the symptoms of the eruptive fever may be safely moderated by the regular and daily evacuation of the intestinal canal. When the rash is steadily established, the same process may be continued, merely with the view of obviating irritation, and preventing the accumulation of peculiar matter, or mucous or other secretions in the intestinal canal. If at this period diarrhœa supervene spontaneously, it need not be checked, for it generally alleviates the general fever and the local inflammation. If it do not take place, it will be requisite to administer suitable cathartics, in order to effect by art those changes which in favourable cases are accomplished by natural means. For this purpose any of the usual pur-

* Med. and Surg. Journal, Vol. ix. p. 408.

gative medicines, as senna, the aloetic pill, castor oil, or any of the neutral salts, may be advantageously exhibited.

The *Sequelæ* of the disease must be treated according to the particular circumstances of each case.

§. II. Scarlet-Fever, Rash-Fever; *Scarlatina*, *Rossalia*; Fievre Rouge Scarlatine; Das Scharlachfieber.

Observations on a particular kind of Scarlet Fever that prevailed at St Albans, by Nathaniel Cotton, M. D. Lond. 1749.—Remarks on the Angina and Scarlet Fever of 1778, by James Johnstone, M. D., &c. Memoirs of the Medical Society, Vol. i. p. 388. London, 1787.—Of the *Scarlatina Anginosa*, as it appeared in London in the year 1786, by James Sims, M. D., &c. Memoirs of the Medical Society, Vol. iii. p. 355. London, 1792.—An Account of the Scarlet Fever and Sore Throat, or *Scarlatina Anginosa*, particularly as it appeared at Birmingham in the year 1778, by William Withering, M. D. Birmingham, 1793.—Cursory Remarks on the Appearance of the *Angina Scarlatina* in the spring of 1793, by John Coakley Lettsom, M. D., &c. Memoirs of the Medical Society, Vol. iv. p. 280.—Sketch of a Description of a species of *Scarlatina Anginosa*, as it occurred in the autumn of 1798, by James Sims, M. D., &c. Mem. Med. Soc. Vol. v. p. 415.—Facts and Observations on Sarlet Fever and Acute Contagions, by W. Blackburne, M. D. 8vo. Lond. 1803.—Practical Illustrations of the Scarlet Fever, Measles, Pulmonary Consumption, and Chronic Diseases, by John Armstrong, M. D. Lond. 1818.

“Physicians are now pretty well agreed,” says Dr Withering, “that the scarlet fever of Sydenham is a very different disease from that described by our countryman, Dr Morton, in the last, or by Dr Cotton in the present century: but doubts yet remain whether this last disease, which Sauvages has not inaptly called the *Scarlatina anginosa*, be or be not the same with the *Angina gangrenosa*, or ulcerated sore throat of Fothergill and Huxham. Each opinion has its abettors, and each may boast the support of very high authority.”

The Rash-Fever, or what is named by physicians from the colour of the eruption *Scarlatina*, has been said to occur under various forms; 1st, the Simple Rash-Fever (*Scarlatina simplex*); 2d, the Rash-fever with sore throat (*Scarlatina anginosa*); 3d, the Malignant Rash-fever (*Scarlatina maligna*); and 4th, the Malignant, Putrid, or Ulcerous Sore Throat (*Cynanche maligna*,) in which there is no rash whatever. Although physicians have not given the name of Scarlet fever to the last variety, in which, indeed, there is no affection of the skin, yet it has been the custom, almost universally of late years, to account this a mere variety of the disease. The circumstances which led to this conclusion seem to have been chiefly its prevalence during the same epidemic, and the Rash-fever being itself ge-

nerally attended with an affection of the throat; but although this likewise led to the inference that it depends on the same morbid poison, we must question the propriety of associating them together as varieties of the same disease. I am not certain that I could assign stronger or more satisfactory reasons than those which Dr Cullen has adduced for this separate arrangement of these diseases: and while I therefore refer my readers to the work of this eminent physician,—I may add, that, as my plan requires me to observe the order of the animal tissues as closely as convenience and nature permit, and as it is quite possible for the same morbid poison to generate two different diseases, according to the part or parts on which its immediate action is exerted, so I shall here confine my observations to that disease only, in which the skin is occupied with a close and diffuse redness of a high scarlet-colour, appearing on the second or third day of fever, with or without a similar redness of the mucous membrane of the throat, tonsils, or moveable palate, and terminating in about five days.

According to this view we have three forms of rash-fever.

1st, Simple Rash-Fever, *Scarlatina Simplex*.

2d, Throat Rash-Fever, *Scarlatina Anginosa*.

3d, Malignant Rash-Fever, *Scarlatina Maligna*.

1. In the simple Rash or Scarlet fever, the usual sensations of cold, weakness, or muscular pains, are quickly succeeded by the regular hot stage. On the second day the skin of the neck and face begins to present innumerable red points, which in a few hours, or at most within the diurnal revolution, are found over almost the whole body. In general they are most distinct and soonest visible on the anterior division of the cutaneous surface, and at the flexures of the joints. As the spots multiply, they extend and coalesce into small patches, and on the following day (third) form a diffuse and cutaneous redness over the limbs, and especially the fingers. The skin of the trunk is seldom universally affected, but presents irregular patches, with interstices more nearly approaching the natural colour of the skin. On the neck and breast, especially in fair and florid subjects, it is not uncommon to observe miliary vesicles; and on the extremities minute pimples, with a degree of goose-skin, dry and rough, are very frequent.

At the same time a similar scarlet redness may be observed on the mucous membrane of the mouth, throat, nostrils, and

even that of the conjunctiva. The papillæ of the tongue are elongated, and extend in the form of oblong scarlet points through the fur with which it is loaded. The face in general is considerably swelled; and the heat, dryness, and tension of the whole skin are exceedingly distressing. There is always great restlessness, sometimes raving, anxiety at the breast, oppressed and quick breathing, and rapid strong pulse, with very scanty urine, and no tendency to moisture of the skin; and these symptoms, which precede the eruption, are very seldom alleviated, often actually augmented, as long as it continues. In a few mild cases little or no fever is observed, and the Rash seems to give rise to scarcely any obvious indisposition.

The fourth day may be deemed the period at which the eruption, and also the fever, attain their greatest intensity. On the fifth it begins to decline, leaving red patches with interstices of the natural colour, in the same order in which it had commenced. On the sixth day the scarlet colour is indistinct, and before the end of the seventh it is entirely gone. During the eighth, ninth, and sometimes the tenth, days, the old cuticle, which is in general dry and hard, is removed in a scurfy desquamation, and succeeded by a newly-formed one, which for some time is redder and more tender than the first.

This form of scarlet fever may occur at any season, but is more usually observed about the end of summer.

2. Throat rash-fever (*Scarlatina Anginosa.*) The second variety of rash-fever is characterized by the greater violence of the concomitant fever, less regularity in the appearance and progress of the eruption, and a much more considerable affection of the mucous membrane of the mouth, throat, and perhaps of the whole mucous surfaces.

On the first and second days the febrile symptoms are rapid in their progress, and severe in degree. The breathing is quick, anxious, and oppressed, and interrupted with occasional sighing; the pulse is rapid, generally hard and full, sometimes small; the heat more intense than in any other fever of this climate, rising to 106°, 108°, and 112° of Fahrenheit; thirst incessant, with sickness, restlessness, raving, and headach. The tongue is always much furred, sometimes dry or viscid, and through the yellow or brown fur oblong red eminences are observed, which are found on examination to be enlarged papillæ.

The rash may appear either on the second or third day, but

does not uniformly cover the whole cutaneous surface. The most common situation for it is about the elbows, the wrists, inside of the thighs, the hams, the palms of the hands, the soles of the feet, and more generally the anterior than the posterior part of the person. After its first appearance it may vanish, and reappear partially, but without much alteration in the constitutional symptoms, which in general retain their uniform severity and violence. Its complete and sudden disappearance is to be regarded as a rare and rather dangerous occurrence.

Dr Withering, who observed this disease with the greatest attention, found the whole person generally affected with the efflorescence; and not inaptly compares the appearance produced by the general redness and swelling to that of a boiled lobster. The redness vanished on pressure, but quickly returned. The skin was smooth, without pimples or other elevations; but in some cases livid spots were interspersed, especially on the neck and breast. I observed nearly the same phenomena in this disease as it prevailed at Edinburgh and the vicinity in the summer of 1818. The scarlet redness was very general over the whole cutaneous surface; the heat and dryness of the skin were extreme; the mucous membrane of the throat was much swelled, the voice hoarse and rough, and swallowing impaired; and the pulse was very quick and feeble, with great oppression of the respiration.

The affection of the throat commences occasionally with the fever, or even before it, most commonly with the cutaneous redness, but sometimes not until the eruption attain its height. In the first case, a sensation of stiffness, and a dull pain on moving in the muscles of the neck, are the marks of its approach; the following day (second) the throat is rough and straightened, the voice thick, and sometimes hoarse, and deglutition is painful. When the Rash comes out, which occurs either on this or the following day, these symptoms are more marked; and if the throat be examined, much redness in patches, and stellular or starry streaks, with some swelling, are found in the soft palate, uvula, tonsils, and posterior membrane of the pharynx. Numerous aphthous vesicles are formed of the mucous epidermis, which coalescing, and afterwards bursting, discover a raw red surface, the true mucous corion, and exhibiting the appearance of ulcers, or rather excoriations, which, however, in ordinary cases, soon manifest a tendency

to form a new mucous epidermis. These are what have been named the *sloughs* of the scarlet sore throat.

The formation of aphthæ is not, however, a uniform occurrence in this disease; and the practitioner must not mistake for these objects numerous white substances, which always, to a greater or less extent, cover the uvula, tonsils, and throat, in Rash-fever. These are portions of thick viscid mucus, which is thus altered in consequence of the deranged state of the membrane secreting them, which presents, instead of a semifluid and semitransparent mucus, a thick opaque viscid substance, which adheres with much tenacity to the parts affected.

No difference of phenomena is observed when the sore-throat comes on at a later period of the disease. In general, when it appears before the eruption, it is severe and tedious; when along with it, it is comparatively mild.

The redness which I have now described is not always confined to the throat and palate; it sometimes extends down the œsophagus, and more rarely into the windpipe and bronchial membrane; always adding much to the severity of the disease, and the ambiguity of the event. In plethoric adults I have seen the rash, besides occupying the cutaneous surface, extend over the whole mucous membranes, not excepting those of the urinary system, from the pelvis of the kidneys down to the bladder and urethra. This form of the disease is always very violent, and the cases of it which presented these changes terminated fatally before the fifth day.

The Throat Rash-Fever may terminate in health or convalescence, in other diseases, or in death.

1. I have said that Simple Scarlet Fever terminates in general on the eighth, ninth, or tenth day of the rash, in distension of the old cuticle, and formation of a new one. That in which the throat is affected may terminate about the same time in the same manner, and leave few traces of its presence, except rawness and tenderness of throat, which after several days also disappear. In other cases it is followed by some disagreeable effects, which require the further aid of the medical attendant. Of these the most common is an anasarcous swelling, sometimes confined to the face and extremities, sometimes diffused over the whole body. In less favourable cases still, effusion may take place into some of the cavities, and produce either a very tedious, or sometimes, as when it occurs in the

brain, speedy and unlooked for death. Throat Rash-fever may also terminate in any of those disorders which succeed to measles.

2. When it terminates fatally death is produced, 1st, by the intensity of the febrile commotion, or by the impaired action of the capillary system producing fatal compression of the brain; 2d, by the severity of the inflammation of the mucous membrane of the bronchial tubes producing suffocation; 3d, at a later period of the disease by the general loss of power, which the disease has inflicted on various organs and functions, but especially on the pulmonary circulation, the heart, and the circulating function. This last is death by *exhaustion, general debility*, and other vague terms employed by writers who believe in the excitability and other mysterious powers of the human body.

3. The Malignant Rash-Fever (*Scarlatina Maligna*) is said to be characterized by the great severity of its symptoms, the faint and irregular appearance of the eruption, and the affection of the throat presenting those marks which are thought to indicate an early tendency to gangrene.

The severity of the constitutional symptoms is known by the smallness, feebleness, and irregularity of the pulse, the oppressed, short, and quick respiration, the appearance of early raving, stupor, and sometimes coma, alternating with fretfulness and violence, dulness and suffusion of the eyes, flushing of the cheeks, and dark-brown furred tongue. Though the tongue and throat are dry, the patient does not complain much of thirst; and the heat of the surface is said to be less intense and steady than in the other forms of scarlet fever. The rash appears late, and is uncertain in its duration; but after it has appeared it soon assumes a dark or livid colour; in other instances it disappears in a few hours, and comes out again perhaps after several days, when it follows the same course.

The aphthous elevations in the throat, which are surrounded by a livid base, quickly become dark, and bursting, disclose excoriated surfaces of a dark and gangrenous appearance.

The passages are always clogged up with much viscid mucus or phlegm, which produces a rattling noise in breathing, and augments much the pain and difficulty of swallowing. An acrid sharp discharge from the nostrils and posterior nasal passages occasions much soreness, chops, and even blisters, and seems

further to be connected with the severe diarrhœa, which generally at this period adds much to the sufferings of the patient.

The severity of these symptoms may produce death on the second, third, or fourth days of the disease, more especially by gangrene occurring in the course of the œsophagus or alimentary canal. In other instances, in which the early symptoms have not been remarkably severe, the aphthous state of the throat has all at once assumed a sloughing aspect, and carried off the patient at the close of the first week or beginning of the second. When the disease continues beyond this time, death generally takes place rather by the distended state of the capillary system, and the perversion or extinction of action with which this state is accompanied, than in consequence of any local malignity or mortification. In such instances the pulse continues very rapid, small, and weak; the respiration languid and oppressed; frequent fluid stools of acrimonious matter are discharged from the bowels; blood is discharged from the nostrils, mouth, throat, bowels, or even from the kidneys; petechial spots and *vibices* appear on the skin; and the patient is destroyed by the combined effects of capillary disorganization in several different parts and organs.

When the immediate symptoms of malignant Scarlet Fever disappear or are obviated, very troublesome effects often remain for a considerable time, and render the state of the patient very doubtful. Of this description are ulceration of the throat spreading to the contiguous parts; suppuration of the glands; chronic inflammation of the tympanal cavity, tympanal bones, and mastoid process; tedious and lingering cough and *dyspnœa*, indicating in all likelihood an inflamed state of the bronchial membrane; excoriations about the nates, sacrum, &c. and sometimes chronic abscesses in various regions of the cellular substance. Most of these conditions are attended with constant fever, which bears the character of hectic, and which is probably symptomatic of the local disease.

The history now delivered of the phenomena of the principal forms of Rash-Fever shows clearly that they differ only in degree. From the simplest and least dangerous, indeed, in which the throat is little, if at all, affected, to the complicated and dangerous disease in which that part of the alimentary canal or inner mucous surface seems to be threatened with sudden mortification, the features of difference are not so wide as to

constitute a separate or distinct disease ; and the discerning observer will easily trace a general resemblance between the morbid processes of each form of the malady. The phenomena in the living body, and the appearances left by its action on the dead, may, in short, lead to the following inferences on the nature and various forms of scarlet fever. The morbid process which gives rise to its symptoms, consists in an overloaded state, or inflammatory condition of the capillary vessels of the outer surface of the cutaneous corion, and the corresponding surface of the mucous corion. This overloaded condition of the cutaneous and mucous capillaries may vary in degree in both, and may alternate from the capillaries of the one to those of the other. *1st*, The capillaries of the cutaneous corion may be much affected, without corresponding distension of those of the mucous corion, which in some instances may scarcely be affected at all. Either case will constitute the simple form of rash-fever in different degrees. *2d*, The capillaries of the cutaneous corion, and those of the mucous corion, may be equally affected ; or those of the cutaneous corion may be distended, while those of the mucous corion are very much distended. Either of these cases will constitute the Sore-Throat Rash-Fever in various degrees of severity. *Lastly*, When the capillaries of the mucous corion in general are extremely or inordinately affected, with or without affection of the cutaneous capillaries, it will form the extreme case termed by practical authors Malignant Scarlet Fever. In this last case the inordinate affection of the capillaries has a strong and almost irresistible tendency to disorganization.

It may seem singular that the mucous membrane of the throat appears to be so particularly affected as it is in this disease. The truth is, that the redness is not confined to this part, but extends in various degrees over the mucous corion of the whole gastro-pulmonary surface, and often of the genito-urinary surface. It is, however, greatest and most conspicuous at this part, which is extremely vascular ; and, in consequence of the looseness of the membrane over its subjacent parts with much filamentous tissue, it reddens and swells more readily. To this is to be added, that the motions of deglutition and respiration painfully engross the attention of the patient ; while the narrowness of the passage makes any slight diminution of its dimensions be easily felt. For these reasons the affection of

the throat is much attended to in scarlet fever, while the redness and distension of capillaries of the mucous membranes in general is entirely overlooked.

The Treatment of Scarlet Fever is to be accommodated to the form of the disease, and the severity of the symptoms.

In its most simple form it is generally entirely free from danger; and the opinion of Sydenham, that its risk arose from the officiousness of the medical attendant, is generally adduced to demonstrate its innocence, and to inculcate the necessity of abstaining from much active management. The whole duty of the physician may indeed be comprised in taking care that the apartment of the patient be kept cool; that he be supplied with cool, diluent, sub-acid drinks, with whey or arrow-root for nourishment; and that the regular evacuation of the bowels be effected by proper doses of purgative or aperient medicine.

The management of the Throat Scarlet Fever and the Malignant has given rise to considerable controversy, and the most opposite remedies have been recommended at different periods by different physicians. There is little doubt that this discordance has arisen partly from the disease occasionally getting well without any remedial means whatever, and partly from those remedies which have been adopted having no real influence over it. Observation of the disease, knowledge of its pathology, and experience of the circumstances under which a favourable event has taken place, suggest the following mode of management.

The administration of such remedies as act on the general circulation; of those which act on the gastro-enteric mucous membrane and its circulation; and of those which act on the skin and its circulation.

The only remedy which can be said to act directly on the circulation is blood-letting, general or local. Physicians are not unanimous in recommending its use in scarlet fever, and especially in that in which there is a tendency to capillary disorganization. It should be used only where there is much oppression or pain of the head or chest, after the eruption is steadily out, and at the early stage of the eruption. Fifteen, twenty, or twenty-five ounces, may be taken from an adult.

The remedies which act on the gastro-enteric membrane are less objectionable, perhaps equally efficacious, and are particularly recommended, by being admissible at every period of the

disease. The use of emetics only is restricted by the best authorities to the commencement of the attack. That of purgatives at any time from the beginning to the termination of the disorder is not only useful but necessary to the cure; and, if properly and seasonably administered, may entirely supersede blood-letting and vomiting. Dr Hamilton observed the pungent heat of surface, violent headach, flushed and swollen countenance, and full quick pulse, to be quickly subdued by one or two brisk purgatives. Full purging is not required in the subsequent periods of the disease, in which the sole object is to remedy the impaired action of the intestines,—to secure the complete and regular expulsion of their contents,—and to prevent the accumulation of feces, which aggravates the symptoms and the sufferings of the patient. The fears of the older physicians, that purgatives were injurious, are quite groundless; and premature fading, or striking-in of the rash, has never been observed to follow their administration. They also prevent the supervention of dropsy, or, if it does come on, are the most certain means of removing it.

It is not of great moment to be solicitous about the selection of purgative medicines. The chief object to be kept in view is the production of the effect. The state of the intestinal mucous membrane in scarlet fever is in consequence of the congestion or accumulation of blood in its capillary system, sometimes very unfavourable to the action of purgatives and the expulsion of excrement. This, however, can only be ascertained by experiment in each case; and if one purgative medicine does not move the bowels, another must be administered. In general, the most certain in its operation in every case is senna infusion, either alone or with cream of tartar, the aloetic pill, the colocynth pill in sufficient quantity, and powder of jalap, either with calomel or with cream of tartar. For children calomel is expedient, in consequence of the small bulk in which it may be given. All remedies of this kind should be managed so as to produce their effect during the day; and the attendants should, as in similar instances, be rigorously enjoined to preserve the discharges for inspection, that the physician may be satisfied as to the effects of his prescriptions, and the state of the intestinal canal of the patient.

Of remedies which operate on the skin and its circulation, it is requisite to mention only the most efficient,—cold, in the

form of cold air, and cold water. The extreme and pungent heat of the skin are perhaps the most distressing of the symptoms of scarlet fever in every form ; and the degree of these symptoms is in the throat-rash, and many cases of the malignant, the index or test of the violence of the disease. The most direct means of controlling this violence, as of alleviating the symptoms, consists in the free admission of cold air to the apartment of the patient, and occasionally to the surface of his body. If this be not sufficient to alleviate the heat, and render the skin moist, he ought to be washed with cold water twice or three times daily, as the urgency of the symptoms demand. This application generally diminishes the quickness and strength of the pulse, the heat and dryness of the skin, and causes some tendency to moisture, or even sweating. A more powerful form still of this application is found in the cold affusion, the use of which will be invariably found to produce the most conspicuous and beneficial effects. It should be used whenever the skin is hot and dry, when it not only reduces the temperature to a more natural state, but generally promotes perspiration, and, instead of the restlessness and anxiety, renders the patient tranquil, comfortable, and disposed to sleep. If the heat, dryness, and restlessness return, it should be repeated again and again, until every morbid sensation of the skin be banished. This remedy supersedes the use of antimonial and saline diaphoretic medicines, which are utterly useless, and in general injurious, and always unavailing in producing sweating, and ought therefore to be entirely abandoned.

Cold or iced-water taken into the stomach is also very grateful, and generally operates in diminishing heat and promoting perspiration. It may be acidulated with lemon-juice, cream of tartar, or a few drops of the aromatic sulphuric acid, or of the oxygenated muriatic or eu-chloric acid.

A blister applied to the throat is sometimes very useful in diminishing the swelling and pain of the internal membrane. Gargles exert, in general, an effect merely palliative ; but they are always used ; and, as the patient not unfrequently places more confidence in them than in all other remedies, however powerful, it is judicious to use those which are likely to do some good. Vinegar, the oxymuriatic acid, or a solution of muriate of ammonia, are the best. Raspberry vinegar is a

popular and fashionable application, both as a gargle and a medicinal drink. It is very harmless, but quite useless.

In the treatment of the malignant form of the disease, experience has shown that medicine has little influence. I can add nothing to what has already been said, unless that all the remedial measures ought be enforced with the utmost vigour, celerity, and steadiness.

§. III. Common Rash. *Erythema*. Die Hautröthe, Germanorum. Plenck.

The term *Erythema* has, like that of *Erysipelas*, been employed in a manner a great deal too vague for the purpose of the accurate observer. Dr Cullen was perhaps the first who attempted to circumscribe its application, by restricting it to denote redness of the skin only, without fever, or at least with fever symptomatic of that redness, without seeming to employ any other characters to distinguish it from the Rose (*Erysipelas*.) Professor Callisen of Copenhagen has more recently ranked it in his view of surgical diseases as a mild species of *Erysipelas*; and it is certain that, in several circumstances, it resembles this disease so closely that there is some reason for the arrangement. Dr Willan employed the circumstances of absence of primary fever, and termination in blebs, to distinguish it from this disease; and I am, on the whole, inclined to adopt this mode of viewing the subject. It must not, however, be forgotten that, by the term absence of primary fever, is understood, in this case, the want of thirst, violent, and well-marked commotion of the circulation with which the Rose is ushered in. The *Erythema*, or Common-Rash, is always attended with some disorder of the constitution; but this affects rather the functions of the alimentary canal than those of any other organ or set of organs. With these limitations, therefore, I employ the terms Simple or Common-Rash (*Erythema*,) to denote a continuous redness of the skin, sometimes with, more frequently without, well-marked swelling, without general or obvious disorder of the circulation, but with symptoms indicating affection of the alimentary canal. Of this disease I distinguish seven forms.

1. Fleeting-Rash (*Erythema fugax*) consists of red patches, of irregular form and short duration, resembling the redness occasioned by pressure. The patches, which appear succes-

sively on the arms, neck, breast, face, and outside of the thighs, do not appear to be attended with any painful sensations of heat, swelling, or itching. They generally occur in circumstances which denote a weak and irregular state of the circulation and general health. They appear in the course and about the termination of febrile diseases, in bilious diarrhœa and other intestinal disorders, and, indeed, may take place in all affections in which the alimentary function is much deranged; in *dyspepsia*, *chlorosis*, *hysteria*, *hemicrania*, &c. The Fleeting-Rash is, indeed, to be viewed as a cutaneous affection, symptomatic of some unhealthy state of the system.

2. Glossy-Leg (*Erythema læve*) is characterized by a uniformly smooth, shining, tense state of the skin, appearing generally in the lower extremities, in confluent or at least extensive patches, and accompanied with an œdematous or anasarous state of the cellular membrane. It may appear in any class of persons whose habits are sedentary; but I have found it most frequent in young females who are inattentive to the state of the alvine discharges, who are rather corpulent, and in whom the menstrual function is irregular. It is also found in elderly subjects, especially such as are addicted to excessive drinking, and in these it is accompanied with much painful tension and heat, and is liable to terminate in bad ulcers. Its ordinary termination is in extensive desquamation.

Attention to the state of the alimentary canal, diuretics, and afterwards gentle exercise, comprise the treatment of this disorder. In the form which occurs in the aged, the horizontal posture of the limbs, with the local application of spirituous lotions, is useful.

It may occur secondarily in anasarca, and can then be removed only by combating the original disease. Lastly, it may occur without œdema in females at the menstrual period, especially when the bowels are disordered; it then disappears under the use of moderate doses of laxative medicine.

3. Bordered Red-skin (*Erythema marginatum*) occurs in patches bounded on one side by a hard elevated tortuous red border, but on the open or spreading side without regular boundary; the red skin is sometimes obscurely papulated. These patches appear on the skin of the loins and extremities in old persons, and remain an uncertain time without producing any uneasy feeling or remarkable irritation. Their appearance is

connected with some internal disorder, and is to be deemed unfavourable.

4. Pimply Red-skin (*Erythema papulatum*) is characterized by extensive irregular patches of rough and imperfectly papulated skin, which, after a day or two, assumes a bright-red colour, not unlike to the appearance of being painted. They occur chiefly on the neck, breast, and arms, where the cutaneous tissue is most delicate. The redness continues about a fortnight, and, as it fades, assumes a bluish hue, especially in the central parts of the patches. This is perhaps the only form of the common-rash which is occasionally attended with signal disorder of the constitution; a small frequent pulse, complete loss of appetite, mental depression, muscular languor, with acute pains and great tenderness in the limbs. Light diet, with diaphoretics and the mineral acids, and attention to the state of the bowels, constitute the treatment of this disorder.

5. Knotty Red-skin (*Erythema tuberculatum*) resembles the last form in the large irregular patches of red skin which it exhibits; but it is distinguished by small slightly raised elevations of skin interspersed among the patches, which subside in the course of a week, leaving the rash, which becomes blue, and disappears in a week more. It commences with feverish motions, is accompanied with languor, restlessness, and irritability, and succeeded by a hectic condition. It is an uncommon form of the disease, and in the few cases in which remedies have been employed, they have had little influence in alleviating its symptoms, or shortening its course.

6. Knobbed Red-skin (*Erythema nodosum*), a more common and milder complaint, seems to be peculiar to females in whom the menstrual function is irregular, or in whom the alimentary function is disordered, either primarily or in consequence of other causes. After symptoms of disordered digestion, as thirst, loss of appetite, &c. have continued for a week, there appear on the fore part of the legs large oval patches, the long diameter of which is parallel with the *tibia*, and which slowly rise into hard painful protuberances, and gradually soften and subside in the course of nine or ten days. At the same time, the red colour becomes blue on the eighth or ninth day, as if the leg had been bruised. It is always a mild disease; and laxative medicine, with the use of the mineral acids, is all that its treatment demands.

7. Friction-Gall, or Chafed-skin (*Erythema Tripsis.*)—In corpulent persons, especially of the temperament named sanguine, contiguous surfaces, as the skin of the *axillæ*, that of the groin in both sexes, and that beneath the breasts and between the thighs in females, are liable to become red, tender, and sometimes raw and excoriated. In some of these cases the redness is accompanied with a fetid, glairy secretion, which seems to proceed from the sebaceous glands; in others the surface is dry, and the redness ends in a scurfy or scaly exfoliation.

In most persons who are long confined to bed by wasting diseases, as consumption, lumbar abscess, diseased joints, or even in the course of lingering fevers,—in those, in short, who are bed-ridden, the parts of the skin on which the body is supported, viz. corresponding to the *sacrum*, *trochanter major*, tips of the ear, *scapulæ*, and shoulders, are sooner or later affected with redness, tenderness, desquamation of the scarf-skin, and finally, ulceration with death of the corion. These states of the skin, which are what Sauvages and other nosologists have named *Intertrigo*, *Erythema paratrimma*, *Erythema a compressione*, are occasioned by friction, and constant or repeated pressure. To obviate the first cause, astringent lotions, as those of Goulard's solution, white vitriol, or spirituous embrocations, as tincture of camphor, or soap-liniment, are very useful; in relieving or preventing the second, the use of unctuous liniments, alternated with spirituous embrocations, will be found most efficacious. The ordinary resinous ointment, either alone or mixed with equal parts of turpentine, or tincture of camphor, has afforded much relief; and the soap-liniment will be found indispensably necessary. The liniment of white of egg, which has been much extolled, is absolutely inert and useless, and ought not to be trusted to. When death or ulceration of the corion has taken place, the ordinary means, as recommended in Surgical Works, must be employed.

A similar form of erythematic redness is often produced by the transition of acrid discharges over the skin. Examples of this occur in several of the vaginal discharges, gonorrhœa, dysentery, the ichorous matter of cancer, the urine and alvine discharges of infants and bed-ridden persons, when cleanliness or proper change of linen is neglected. The treatment is reduced to the removal of the causes, and the employment of astringent lotions or absorbent powders.

In the form of erythematic redness, which is the result of the incessant trickling of the urine from a bladder which has lost its power, either from general or local palsy, the most effectual remedy is the periodical introduction of the catheter, and anointing the parts with axunge, or an ointment consisting of seven drachms of axunge and one drachm of sulphate of zinc. It will be generally found that the reason why the urine constantly trickles from the bladder is, that the latter organ has been distended beyond its powers, and that the urine runs off in consequence of the overdistension and excess. The most effectual method to enable the bladder to recover its contractile power is to prevent accumulation and distension by the frequent introduction of the catheter.

§. IV. Rose-Rash, *Roseola*. Die flache rothe Flecke?

The Rose-Rash is generally symptomatic, and derives importance only from its close resemblance to measles and scarlet fever, with which it has been sometimes confounded,—a circumstance which has perhaps given rise to the opinion among careless observers, that both of these diseases were liable to attack the same individual twice. It appears in the form of irregular, or variously-figured patches, of a bright rose colour, without pimples or any other elevation of the skin; not communicable by contagion. It has been observed to occur under the following forms.

1. *Roseola æstiva*, Summer Rose-Rash, may be general or partial. In the first case it is usually preceded for a few days by febrile indisposition. It appears first on the face and neck, and in a day or two extends over the rest of the cutaneous surface with much itching and tingling. The patches are of various form, but larger and more irregular than those of measles, with numerous interstices of the natural colour. At first they are red, but soon assume the deep rose colour; and at the same time the membrane of the throat is reddened, and the patient complains of roughness in attempting to swallow. The redness continues vivid through the second day, after which it fades, leaving dark-red specks only on the fourth, and totally disappearing with the general disorder on the fifth.

When this rash is partial, it occupies portions only of the face, neck, and upper part of the breast and shoulders, with rose-coloured patches, slightly elevated, and rather itching.

It is generally a more tedious form, continuing a week or longer, and disappearing and returning suddenly without apparent cause, sometimes, however, after mental emotion, taking wine, spices, or warm liquors. Its disappearance is usually accompanied with disorder of stomach, headach, faintness, &c. which are relieved on its return.

This variety of Rose-Rash occurs commonly in summer in females of irritable constitution, and is ascribed to alternations of heat and cold, drinking cold liquors after exercise, or general derangement of the alimentary function. Its treatment is limited to the removal of the causes which gave rise to it; and this is most safely accomplished by the exhibition of laxatives, diluted doses of the mineral acids, and a light, plain form of diet.

2. *Roseola autumnalis*, the autumn Rose-Rash, confined to children, appears in distinct circular or oval patches, of a damask-rose colour, which increase gradually to the size of a shilling. They appear chiefly on the arms, and continue about a week, with little itching, tingling, or general disorder, and usually terminate in desquamation. It requires almost no treatment, but its disappearance is facilitated by open bowels, and moderate doses of the sulphuric acid.

3. *Roseola annulata* is distinguished by rose-coloured rings inclosing central areas of natural skin, which appear on almost every part of the person. It may be accompanied with feverish symptoms, and then its duration is short and its form acute; but, when without these, it may continue for a considerable and uncertain period. These rings, which are at first from one to two lines in diameter, dilate gradually, leaving a larger colourless centre, sometimes to the diameter of half an inch. The redness is less vivid, and in the chronic form usually fades in the morning, but returns in the evening or night with heat, and itching or prickling in the skin. If it disappear, or become faint in colour for several days, the stomach is disordered, and giddiness, languor, and pains of the limbs ensue,—symptoms which are relieved by the warm bath.

Sea-bathing and the mineral acids are said to afford much relief in the chronic form of the ring-like *Roseola*.

4. *Roseola infantilis*, a closer rash, or with smaller interstices than the summer rose-rash, occurs in infants during the irritation of dentition, of disordered bowels, and in fevers. It is very irregular in appearance, sometimes continuing for one

night only, sometimes appearing and disappearing for several successive days with violent disorder, and sometimes arising in single patches in different parts of the body successively. When generally diffused, it may be mistaken for measles or scarlet-fever, but the absence of the crescentic spots in the former, and the deep scarlet of the latter, will enable the observant physician to distinguish it from these diseases. Its treatment is comprised in the removal of the disorders on which its presence depends.—(Underwood, Diseases of Children, Vol. i. p. 87.)

Roseola Variolosa.—When small-pox inoculation was practised, this rash was frequently observed to precede the variolous eruption. It has been since ascertained that it occurs in about one case of fifteen of the inoculated disease, and that it appears on the second day of the eruptive or variolous fever, which is generally the ninth or tenth after inoculation. It occurs also, though much more rarely, in the natural disease. It is seen first on the face, breast, and neck, and the following day it is found on the skin of the trunk and extremities. Its distribution is various, sometimes in oblong irregular patches, sometimes in spots diffused with numerous interstices, and in a few cases it forms a redness almost continuous over the entire skin, with slight elevation in some parts. It continues about three days, on the second and last of which the variolous pustules may be distinguished amidst the general redness by their elevation, hardness, and white summits.

This rash is generally deemed by inoculators a certain mark of a small and favourable eruption. It is not easily repelled by cold air or cold drinks, which the older inoculators in a great degree prohibited. It requires no particular treatment, as it fades on the appearance of the expected eruption.

The occurrence of this rash previous to small-pox, which was observed and noticed by the first writers on the disease, explains the cases which they have considered as measles which were finally converted into small-pox. It was first accurately described and distinguished by Dimsdale, p. 44, 45.

Roseola Vaccina.—In some children on the ninth and tenth day of vaccination, the skin round the point of insertion is occupied with superficial redness, which consists generally of a cluster of dots, and minute patches, but is sometimes diffuse like the variolous rose-rash. It appears at the same time as the red circle (*areola*,) of the vaccine vesicle, and spreads thence irregularly over the surface of the whole body. It is usually at-

tended with a very quick pulse, white tongue, and great restlessness. These circumstances show that this is very like the rose-rash which takes place after variolation, but it is much less common in occurrence.

Miliary Rose-Rash (*Roseola miliaris*), or roseolous rash, accompanies an eruption of miliary vesicles; it occurs in simple continued fevers, the bilious fever of summer, contagious fever, and intermittents, and in cases of mild fever. In one case, it occurred in patches of a bright rose-pink colour, of an irregular oval shape, somewhat elevated, but smooth, affecting the arms and breast, but more copious in the inside of the shoulder. It was without itching or any uneasy sensation, and was followed by alleviation of the febrile symptoms. The following day, the patches extended and became confluent, but their colour, especially in the areas, faded, or became purple, the margins continuing red and slightly elevated. On the third day the colour was livid, and had vanished on the fourth.

A rose efflorescence is in some cases connected with attacks of gout and of febrile rheumatism, and precedes in general the articular inflammation.

§. V. Nettle-Rash, *Febris Urticaria*; *Uredo*, Linnæus. Ortie; Fievre Ortiée; La Porcelaine? Pinel. Der Brennesse-lausschlag.

The cutaneous inflammations which I have already noticed are examples of the simplest form of that process. They consist in general of redness only of the outer or cuticular surface of the corion;—whatever swelling they present, seems to depend not on elevation of the true skin, but on a general tension of that membrane, occasioned by the very considerable determination of blood to it, while the cutaneous inflammation is in its greatest violence. It is somewhat different with the Nettle-rash, which is to be viewed as the first example of an inflammatory action affecting the corion more completely than the measles, scarlet-fever, or the other rashes. It consists of numerous eminences, various in figure, round or oblong, of a peculiar smooth velvet surface at first, white in the centre, but red at the margins, which are not distinct;—accompanied in general with a very disagreeable heat and itching. When Dr Willan names them elevations of the cuticle, we presume he employs the term merely to express the immediate visible object; for as this part is inorganic, it is insusceptible of swelling,

and it is evidently raised merely in consequence of the elevation of the outer surface of the corion. To show that this is the case, it is only requisite to sting the skin with the common nettle, or observe what follows a severe blow with the lash of a whip. The parts are very soon, almost instantaneously, occupied with general redness and sensations of heat, itching, and tingling; and amidst the red surface appear one or more elevated parts with white centres, the figure of which depends on the manner in which the skin has been affected by the irritating agent.

The same effects result from the local application of various substances which possess certain irritative properties, either mechanical or chemical. The down or minute hair which covers the pod of the cowitch (*Dolichos pruriens*), is known to give rise to the same appearances in most persons; and perhaps many similar substances, and those which are minute mechanical irritants, produce the same effects.

Several marine animals of the Tribe of MOLLUSCA and ZOO-PHYTA possess similar properties. Thus, among the Gasteropodous MOLLUSCA, the *Aplysia depilans*, of the Sea Nettles (ACALEPHÆ,) the *Medusa æquorea* and *Velella*, and the *Physalia* of Lamarck (*Holothuria physalis*, Lin.), of the fleshy POLYPI, the *Actinia coriacea*, Lam., and the *Spongia tomentosa* when dried, possess the faculty, when applied to the skin, of inducing wheals and diffuse red patches, with insufferable itching heat and restlessness, in no respect to be distinguished from Nettle-Rash arising spontaneously. In all these circumstances, the inflammation is obviously different from those which I have already noticed. It is attended with a degree of violent itching and tormenting tickling, which is observed in almost no other example of superficial cutaneous inflammation. The elevated and smooth surface seem, as we have already said, to depend on the state of outer surface of the corion.

After these general observations on the peculiar nature of this inflammation as it arises from a local cause, I proceed to describe those forms of Nettle-rash which, though similar in appearance, are always the result of an internal cause.

1. *Urticaria febrilis*.—The ordinary and most common form is preceded for two days or more by heat, quick pulse, headach, epigastric pain, anxiety, and sickness, languor, drowsiness, and sometimes syncope. The wheals appear in the midst of irregular vivid red patches, sometimes nearly of a crimson colour, and are accompanied with an extreme degree of itching and

tingling, which is always aggravated during the night, or by exposing the affected parts. During the day the wheals subside and the surrounding redness fades, but both return in the evening with slight fever. The red patches are often elevated with a hard border; so that when they are numerous, the face or limb most affected appear tense and enlarged. They are liable to appear and disappear irregularly on most parts of the person, and may be excited on any part of the skin by friction or scratching.

The febrile Nettle-Rash lasts about a week with considerable distress to the patient, in consequence of the heat, itching, and restlessness; the disorder of the stomach alone is relieved by the appearance of the rash, but returns if this disappear. A slight exfoliation of the cuticle succeeds. It occurs chiefly in summer, is often connected with teething or disordered bowels in children; and among adults affects those of full habit, who indulge in the pleasures of the table. In two cases seen by Dr Murray, and quoted by Dr Heberden, it could be ascribed to no cause save an impure diet of bullock's liver and porter, on which the persons in whom it occurred had lived nearly a whole winter. This circumstance, with the feelings of gastric irritation, which always precede and alternate with its formation, indicate that the febrile Nettle-Rash generally depends on an irritating agent, which acts primarily on the stomach, and perhaps the upper part of the alimentary canal. This is much confirmed by the influence which several articles of diet or medicine exercise on peculiar habits in the formation of degrees of the nettle-rash. In some persons it has been observed to appear after eating shell-fish, as lobsters, crabs, shrimps, and especially mussels; in others, after eating oatmeal, honey, mushrooms, almonds, or the kernels of stone-fruit, raspberries, strawberries, green cucumber with the rind on it, and in some it could be ascribed to no other cause but the internal use of valerian. I have seen it occur in a transitory manner over the face, neck, and breast, in one case after eating an unusual quantity of Cayenne pepper, and in another succeed to the application of leeches to the skin of the neck. In both cases it was attended with much tingling and a peculiar stiffness of the skin, and disappeared after four or five hours without leaving much traces of its presence. In instances of this kind, however, the wheals are rarely well-marked, and the rash assumes the appearance rather of diffuse redness, with

much tension and stiffness of the skin ; but the gastric symptoms, as sickness, pain, fainting, and languor, are as obvious and distressing as in the more genuine complete form of the disease. In some instances it is said to have been fatal.

An emetic, followed by a moderate laxative, with light cooling diet, constitute the whole of the active measures requisite in this disease. Stimulating food, aromatics, fermented or heating liquors, and sudorific medicines must be proscribed. At the decline of the rash sulphuric acid, with gentian or cinchona, are useful.

2. Fluctuating Nettle-Rash (*Urticaria evanida*) is a chronic disease, in which the wheals are not stationary, but appear and fade, frequently according to the temperature of the air, exposure of the patient, friction of the skin, or the exercise which he uses,—without fever or derangement of health. The wheals may be round or longitudinal, like those succeeding the stroke of a whip, sometimes slightly red at the base, but never surrounded by an extensive blush,—with itching, tingling, or stinging, which become worse on exposure to heat.

This eruption may last for a few days, or may continue to fade and reappear alternately for months or even years. It attacks persons of all ages, and of both sexes, but especially females, and those of sanguine temperament. Persons affected with it are liable to suffer headach, languor, flying pains, and disorders of the stomach.

If it can be traced to any article of diet, or mode of living, that substance ought to be relinquished, and the food changed entirely. Alkaline remedies with bitters, as soda or potass, with cascarilla, quassia, or gentian afford relief. Proper attention to the bowels by laxative medicines is also very indispensable.

3. Steady Nettle-Rash (*Urticaria perstans*.) Wheals stationary, hard and elevated, with occasional itching, when the patient is heated continuing two or three weeks, gradually subsiding, and leaving a reddish spot for some days.

4. Close Nettle-Rash (*Urticaria conferta*.) Numerous wheals, coalescing, considerably inflamed at the base, with incessant itching, and affecting persons above forty years of age, with dry swarthy skin, and who indulge in rich spiced-food and spirituous liquors. It continues for weeks. Abstinence from the causes, or a restrained simple diet, with alterative medicines, are the most useful remedies. The warm-bath is a temporary palliative.

5. Latent Nettle-Rash (*Urticaria subcutanea*.) This name is given to the sensations of tingling, itching, stinging, and pricking, which are occasionally felt first in one part, as the leg, groin, arm, &c. and then suddenly in another, but without the appearance of actual wheals, which only break out at distant intervals, and continue two or three days, without alleviating the original sensations. In persons thus affected, the stomach is frequently attacked with pain, and the muscles of the leg are subject to cramps. Warm bathing in sea-water, gentle friction, much gentle exercise in the open air, with a restrained diet, are the most effectual means of relief.

6. Knotted Nettle-Rash (*Urticaria tuberosa*.) Large wheals appearing on the limbs or loins, and forming hard knotty tuberosities extending deeply, with heat and pain, and impeding motion. They usually occur at night, and subside entirely before morning, leaving the patient weak, languid, and sore, as if bruised or fatigued. It seems to arise from excesses, too free use of spirits, overheating by exercise, and may be tedious and obstinate. Restrained diet, and the use of remedies calculated to diminish the morbid irritability of the stomach and bowels, are useful.

SECTION II.

Cutaneous inflammations situate chiefly on the outer surface of the corion, producing a sero-albuminous fluid, which elevates the scarf-skin into pushes, blebs, or blisters, (*Bullæ*, *Vesiculæ*); commencing in certain points of the corion, but spreading continuously.

The outer surface of the corion may be inflamed in such manner as to cause a copious effusion of thin watery yellowish fluid on its surface. This is very well seen in the instance of scalding by boiling fluids, or in the application of the blistering-fly (*Meloe vesicatorius*), or even in some cases of friction to parts of the skin naturally tender. In each of these cases, in a short time, especially in that of scalding, large watery elevations or bladders appear, which when cut open are found to contain a yellowish, transparent watery fluid. If the cuticle is detached entirely, so as to expose the surface of the corion thus inflamed, a quantity of thick mucous or albuminous matter, somewhat tough, and not unlike coagulable lymph, will be found deposited on the surface in irregular lines in partitions. These

mucous partitions connect the cuticle to the corion imperfectly, and contain in their interstices the watery fluid which is the result of the coagulation of the former. The mucous partitions are not uniform in number; they may be few,—but they are never entirely wanting. They are a product of inflammation, and are the modified form of coagulable lymph, derived from the inflamed surface of the corion.

The mechanism of the formation of these two constituents of the contents of the blebs is the same as in the serous membranes, but modified by the presence of cuticle. When the cuticular surface of the corion is inflamed its vessels secrete a sero-albuminous fluid, which undergoes, as in other instances, spontaneous separation into a coagulable and a thinner part.

The coagulable portion adhering to the surface of the corion forms the opaque pulpy albuminous matter, and is the rudiment of new cuticle. The serous or watery portion issuing from the part is contained in the cells of the albuminous part as it undergoes coagulation, inspissation, and contraction. That this is also albuminous may be easily demonstrated by touching an open vesication with nitrate of silver, when the albumen is precipitated in the form of a white opaque coating. The only difference between the coagulated and the serous portion is, that the former contains so much more albumen, that it is enabled to undergo spontaneous coagulation, while the latter requires for this purpose the addition of reagents.

§. I. Rose, St Antony's Fire, Turner, Cullen. *Erysipelas*, Turner, Lorry, Sauvages, Lin. Sag. Cullen, Willan. *Rosa*, Sennert. *Ignis sacer*, Celsus, *Hieropyr*. *Ignis Sancti Antonii*. *Febris Erysipelacea*, Hoffman, Vogel. *Febris Erysipelatosa*, Sydenham, Macbride. *Erysipele*; feu Sancte Antoine, mal des ardens? *Risipola Italarum*. *Rothlauf*, Germanorum.

This disease is at once very common and very well-marked. Yet it has given rise to more controversy about its distinctive or characteristic phenomena than could have been expected, or explained in the circumstances of the case. The history of medicine informs us, that it has been always difficult to distinguish it from the common superficial redness (*Erythema*); and from Galen down to Sauvages, Cullen, and Willan, various distinctions have been made to show how it differs from this disease. With ordinary phlegmonous inflammation, whe-

ther we conceive that to be confined to the inner surface of the corion, or to extend to the subjacent cellular tissue, it might have been thought that there was less chance of confounding it; yet its occasional termination in suppuration seems to have suggested to physicians the necessity of offering diagnostic marks, by which this corion may be avoided.

To pass over the more ancient, and perhaps less accurate, distinctions, we find that Sauvages and Cullen laid the whole force of their distinction of Rose from common-rash, on the presence of well-marked fever; and asserted, that what they described as erythema became rose, if it was ushered in by shivering, succeeded by heat, quick pulse, and the other adjuncts of the febrile condition. The accuracy of this view depends, of course, on the sense in which they understood the word *Erythema*; and though it may be doubted whether the true appearances of *Erysipelas* ever occur without some degree of fever, so as to form what they have named Erythema, yet I shall not dwell much on this circumstance. This defect, together with the insufficiency of the ordinary mark given by Galen, and repeated since his time to the present hour, of the redness being affected by pressure, evidently led Dr Willan to look for more decided and characteristic signs; and he imagined that he had found them in the kind of the swelling, the nature of the pain, and the manner in which the process affects the skin towards the close of the disease. "The Erysipelas," says Dr Bateman, "is a febrile disease, in which some part of the body is affected externally with heat, redness, swelling, and vesications. The tumour is soft, diffuse, and irregularly circumscribed, and not accompanied by throbbing or acute pain. The last-mentioned circumstance distinguishes the tumour of Erysipelas from that of Phlegmon; and the presence of tumour, together with vesication, distinguishes the disease from Erythema."

This description is unfortunate in wanting precision, and, what is worse, it is deficient in accuracy. The characters of the erysipelatous swelling are not well or justly given; for although it is diffuse, it is not, as we shall show, irregularly circumscribed; neither can it be said to distinguish the disease from *erythema*; for there is some degree of swelling in every form of this rash, and in some of them it is very considerable. The formation of the pushes or blebs is certainly a more un-

equivocal test ; but the irregularity of their figure and appearance even renders this a less useful mark than it would otherwise be.

The first author, I conceive, who observed the phenomena of the disease with a discriminating eye, was John Hunter ; and I am satisfied, from my own observation, that most of the signs and marks which he has carelessly, indeed, and irregularly recorded, are true to the original features of the disease, and contain the elements from which a correct delineation of it may be formed. I have observed a considerable number of cases with his observations in my mind ; and the description which I am about to give is derived, with the closest attention, from these facts.

A person about to be attacked with Rose is first sensible of a sensation of cold, which quickly, in spite of all means to diminish or prevent it, increases to well-marked and violent shivering ; the whole surface of the skin is constricted as in a fit of ague, the teeth are forcibly dashed against each other, the knees knock, and the whole frame is irresistibly and convulsively shaken for some time. This condition, which lasts a longer or shorter time, according to circumstances, with quick, anxious breathing, small pulse, and considerable muscular debility, gradually gives place to transient sensations of warmth, which are ultimately converted, in the ordinary way, into general heat, with great thirst, bad taste, sometimes sickness at stomach, and vomiting ; at the same time the breathing becomes quicker, more oppressed, and anxious, and the arterial beats are numerous, full, hard and strong ; in some cases the intellect is much affected, the faculties are confused, the patient speaks incoherently, and, during the night, is generally either quite delirious, or is disturbed with frightful dreams. These symptoms undergo some slight modifications, according chiefly to the age, and sometimes the habits of the patient ; in the young, the active, or the well-nourished, they are generally much more distinct than in the old, the sedentary, or the feeble ; but they are never wanting, and the shivering or chill fit of the febrile condition is uniformly well-marked, and, if there be an epidemic, may lead the practitioner to expect the cutaneous inflammation. The symptoms which we have now enumerated continue for about 30, 40, or even 60 hours, with much heat of surface, and without manifesting any tendency

to sweating or any other discharge; and at length some degree of soreness, with burning heat, is felt in some part generally of the side of the head, or, it may be, one of the extremities. When this is examined, the skin is found to be red, tense, somewhat swollen, and a little painful when pressed. These appearances gradually extend for some days from the spot at which they were first seen, until they occupy a considerable portion of skin, but without obvious remission of the febrile commotion. In this condition they can be easily and patiently observed, and the following circumstances will be ascertained.

The red colour is continuous or unbroken, without any patches or spots intermixed of the natural skin; it is not a bright or vivid red, but has generally a tinge of yellow, or is somewhat brown, so that to a careless observer in an apartment indifferently lighted, or at the commencement of the disease, it may not appear to differ from the natural skin, at least when slightly rubbed; it is always dull, or without lustre; and though it disappear on pressure, it returns as soon as this is withdrawn. But the most important circumstance is, that it is bounded by a distinct margin, such that the line between the red and the natural skin might be marked by a pencil. It is not more vivid at one spot of the diseased skin than at another, but is of a uniform brown or yellow red, and does not fade away gradually, or is lost insensibly in the sound skin, as in phlegmon. This fact, which seems to have been overlooked by all except J. Hunter, is nevertheless constant, and would be diagnostic alone, but it must be joined to other phenomena.

The swelling, of which the skin becomes the seat, is level, extended, or what has been termed *diffuse*, without eminence or tapering point (*haud fastigiatus*.) This has led to the mistake of its not being circumscribed, a character which has been transmitted through all writers to the present day, without any attention whatever to the actual state of the phenomenon. In every case of Rose, it will be found that the swelling, though level, uniform, and extended, is bounded by an edge or margin as precise as that which limits the redness. If the affected part be examined by the eye, or felt by the finger, the difference between the sound and the swollen skin will be instantly recognized and marked.

Connected with this last feature, is the hardness or inelasti-

city of the skin. In Drs Willan and Bateman's description, the tumour is said to be soft,—a term which is employed we know not with what standard of comparison. The skin is uniformly immoveable, hard, and inelastic, or appears, as it were, deprived of its natural mobility and flexibility. These facts are also constant and diagnostic.

When the swelling reaches the eyelids, they assume a peculiarly puffy or œdematous aspect, and in general the eyes are shut for a day or two during the height of the disease.

The pain which attends the Rose is accompanied with a sensation of heat, exactly similar to that which takes place when the skin is scalded by pouring boiling water on it. It is searing, scalding, and scorching, without throbbing or lancinating sensations.

After the redness, swelling, and heat, which we have now noticed, have continued for about thirty hours, small flat elevations appear, which on examination prove to be pushes, or blebs, produced by the effusion of a watery fluid beneath the cuticle. These are irregular in figure and size; they may be round or oval; they are seldom less than four or five lines in diameter, and may be as large as a shilling. They may appear at any part of the affected skin, but generally are seen first where the redness and swelling originally commenced. To the fluid which they contain the old pathologists ascribed a peculiar and pernicious acrimony. This I have never observed, and cannot say how far it is well-founded; but I may express my opinion that it is not. It seems to be nothing but the serous part of the blood effused by the same action which takes place when the skin is scorched or blistered. Its chemical qualities have not been examined.

About the same time with the appearance of the blebs, the whole red surface seems to be covered with a dewy or watery exudation in minute quantity; but whether this comes directly from the cuticle of the parts on which it is formed, or is merely the fluid of the blebs, I have not ascertained.

Such are the phenomena which attend the Rose, when the disease assumes its most perfect form, and when the examination is made at that time. I have now to notice the progress and termination of the disease, and the order in which the phenomena take place.

As the disease goes on, the cuticle forming the blebs gives

way, and the fluid which they contain being slowly discharged, they subside, while the surface which they occupied becomes reddish-brown, livid, or black. This colour, however, seldom goes beneath the outer surface of the corion. About the same time the redness fades, and assumes a yellowish tinge; and in the course of a day or two more, as it disappears entirely, the scarf-skin peels off in numerous scales.

I have already said that the febrile commotion suffers no remission on the appearance of the local inflammation. The sickness, indeed, and vomiting, if they are present, are removed, the respiration is less frequent and oppressed, and is performed with less anxiety; but the arterial beats are as numerous as formerly, the heat and dryness of surface are not diminished, the thirst continues, and the tongue is still loaded. Besides these, the affection of the mental faculties continues or is augmented; and in some instances violent delirium terminates in coma, and, this increasing, the patient dies apoplectic on the seventh, ninth, or eleventh day of the disease. Experience and dissections have shown that the symptoms of oppressed brain are in such circumstances simultaneous with the external inflammation, and dependent on the same cause which gives rise to that. When it does not kill directly by acting on the brain, I have seen it leave chronic inflammation of that organ giving rise to palsy. In more favourable cases, the inflammation, after having affected a part, commonly one-half, sometimes the whole, of the face with the contiguous parts of the scalp, ceases, and with it the fever also ceases, and, without any evident crisis, the patient returns to his ordinary health.

The periods at which the different stages of this disease take place in succession cannot be very accurately determined; this depends on the age and habits of the patient, and sometimes on the treatment employed. Its progress is more rapid, and its duration shorter, in the young and sanguine, or full-blooded, than in the old, the languid, or those of inactive habits. I shall, however, attempt to exhibit the relative order of phenomena as nearly as that can be done in the following table.

Duration in hours.	Days of the disease.	Symptoms on each day of the disease.
	1,	Shivering and languor, succeeded by heat, quick pulse, sickness, &c.
30 to 40,	2, even. 3, 4,	Swelling, with pain and redness at side of head; blebs; sickness going off.
40 to 50,	3, 4, 5,	Redness and swelling spreading; much heat and burning; pulse very quick, 120—130.

56 to 84,	4,	5,	6,	Blebs beginning to form ; redness, &c. spreading ; pulse 120—130, 100—120.
	5,	6,	7,	Blebs continuing to form ; redness, swelling, &c. spreading ; pulse 100—120.
	6,	7,	8,	Blebs breaking and discharging fluid ; redness diminishing ; pulse 100—110, 98—110.
	7,	8,	9, or 10.	Swelling subsiding in some parts ; cuticle desquamating ; pulse 80—86.

The local inflammation sometimes terminates in a partial suppuration, which occurs most commonly about the upper part of the cheek or in the eyelid. This suppuration, which is never attended with the effusion of organizable lymph, is generally disjunctive in its effects, and accompanied with the formation of sloughs. The parotid and submaxillary glands, sometimes the cervical, enlarge, become painful and inflamed, sometimes with the swelling of the face, more frequently on the decline, and subsequently end in tedious and painful suppuration.

These events take place chiefly in severe and protracted cases which do not terminate fatally.

When the acute Erysipelas is seated in one of the limbs, it commences with the same symptoms of general febrile disorder which precedes the Rose of the face. On the third day the characteristic swelling and redness appear on the fore part of the leg, generally a little below the knee, and thence extends to the instep, or the sides of the foot. The swelling is of the same kind with that described above (p. 464,) but is generally greater in degree, and the redness, which is continuous, is intense, and luminous or shining on the skin, in consequence of the tension of the thin integuments of that part. The burning heat and pain are most excruciating, and much aggravated by the dependent posture, external heat, or the weight of the bed-clothes. On the fourth day the whole surface is covered with large blebs, which, in about twenty-four hours more, burst spontaneously, and discharge a great quantity of thin watery fluid, which is described as acrid. In the course of this process, the outer surface of the corion is much injured ; when the cuticle has been removed or destroyed, it is found to be in many parts uneven, ulcerated, or eroded, and the surfaces are covered with an imperfect purulent matter, during the secretion of which, the reparative process goes on slowly and indifferently.

The febrile symptoms continue after the blebs have burst, and, if the local inflammation has been considerable, much general irritation subsists for weeks, with restless nights, in consequence of the pain of the limb.

Many writers have said that this disease commences in the inguinal glands, and thence extends to the leg and foot. This is not confirmed by recent observation; and it is much more usual to observe the inguinal glands become enlarged and inflamed after the Rose has affected the leg and foot. The transference (*metastasis*) of the erysipelatous action from one of the limbs to an internal organ, as the brain, lungs, &c. which has been also mentioned, seems to be very rare. I have reason to believe that, if the disease be properly treated, it never occurs.

The acute *Erysipelas* of the superior extremity affects the thumb, or one of the fingers first, with swelling, redness, and vesication, and gradually extends to the wrist and back of the hand, to the middle of the fore-arm. One or two erysipelatous patches are sometimes formed near the elbow-joint. It is attended with the same febrile symptoms which accompany the other forms. The pain, which is always very severe, is much aggravated during the night. The disease lasts for ten, twelve, or fourteen days, when the redness fades, the swelling and pain begin to diminish, with desquamation of the cuticle, though the skin remains for some time tender and slightly discoloured. When suppuration takes place, as happens in severe and unfavourable cases, the matter is formed in the course of the second week on the fingers, back of the hand, or on the arm, and generally with one or more sloughs of the corial tissue. The site of this deposition is generally the inner surface of the corion, and sometimes it would appear beneath the fascia, or among the tendinous sheaths. I am inclined, in the latter case, to consider the disease as not true primary Rose, but either inflammation of the fascia, or an extreme degree of whitloe. Whenever the matter is effused, no lymph accompanies it, at least not to form a cyst.

Erysipelas affecting an extremity must not be confounded with inflammation of the *fascia* (*sparganitis*), disjunctive or spreading inflammation of the cellular membrane, nor in the fore-arm, with violent cases of whitloe, inflammation of the absorbents, or inflammation of the veins. Sir G. Blane, Mr Copland Hutchison, and some other authors, have described a spe-

cies of Rose peculiar almost to mariners, and affecting their extremities, chiefly the inferior, but never occurring in the face or person. It is to be regretted that the accounts are not so minute and precise as to show clearly whether this be the true *erysipelas* or not; but from what Mr Hutchison has himself stated concerning this disease, and from the cases of it which I have myself seen, I must consider it as totally different from Rose, as the inflammation of the *fascia*, or the diffuse or spreading inflammation of the cellular substance; and, I am of opinion, that the redness of the skin which has caused this to be set down as erysipelatous inflammation is symptomatic of, and dependent on, the deeper seated inflammation. I shall, however, consider this subject more fully in its proper place. (Medical Communications, Vol. ii. Art. iv. and v. Lond. 1790.)

2. *Erysipelas œdematodes*, or Pitting-Rose, is distinguished by a pale-red, sometimes a yellowish-brown, colour of the skin, a smooth, shining surface, and a diffuse swelling, extending very gradually, and receiving, when strongly pressed, the mark of the finger. Its accession, also, is said to be less distinct than that of the common Rose, being preceded only by general debility, languor, sickness, and flying pains; but I have observed it ushered in by imperfect shiverings, when occurring in the anterior extremity. It usually affects the face, breast, or one of the extremities; and when the first part is the seat of its actions, it is so much and uniformly enlarged as to resemble a bladder distended with water; the eyes and nostrils are often totally closed.

Erysipelas infantile; *E. Neonatorum*. It would have been unnecessary to establish a separate head for this form of Rose, had it not attracted the particular attention of various practical observers, who have in description distinguished it from the disease as usually prevalent in adults.

Originally seen by Hoffmann, Burgius, and Oehme, it was afterwards described, with various degrees of accuracy, by Bromfield, Gartshore, Underwood, and Walsham in this country, and by Osiander, Hufeland, Reddelin, Sybel, and others in Germany.

From the accounts of these authors, the Infantile Rose betrays its existence by the occurrence of restlessness, sleeplessness, moaning, and sickness and vomiting of coagulated milk, any time between the third and tenth day, or even later,

after birth. These symptoms are speedily followed by a dull-red colour of the skin, sometimes at the navel, sometimes in the groins or at the pubis, and more rarely at the nape of the neck or in the extremities. With the dull-red colour, which is bounded by a distinctly circumscribed edge, and which scarcely disappears on pressure, the skin is at the same time hard, inelastic, hot, tense, and acutely painful; and this condition spreads rapidly, with restlessness, quick pulse, panting and laborious respiration, and green-coloured vomiting or diarrhœa, until in the course of the third or fourth, or at most the seventh day, convulsions, locked-jaw, or *coma*, sometimes with, sometimes without, gangrene, destroy the infant.

The parts, if gangrenous, assume a purple or livescent tint, and sometimes the cuticle is detached in the form of *phlyctænæ*, or thrown off from a raw, dusky-brown, or livescent surface.

According to Gartshore, the viscera were always found in a healthy state; nor could any morbid appearance of the cellular tissue be recognized; and the skin was the only organ diseased. In one case, indeed, in which there was some resemblance of the infantile rose, marks of peritoneal inflammation were found; and this appears to have misled Underwood, who represented the appearances found after death to be inflammatory exudation of the intestinal and abdominal peritoneum, generally uniting the intestinal folds, purulent matter in the chambers of the *tunicæ vaginales*, and matter in the substance of the *labia pudendi*. These are the usual effects of peritoneal inflammation, and have no necessary connection with the cutaneous affection.

This disease, which prevails on the continent chiefly in lying-in hospitals and foundling hospitals, and in this country, also, in the confined and ill-aired hovels occupied by the indigent and the depraved, is said to attack infants chiefly between the period of birth and the sixth week. Underwood, however, saw it in a child of two months. It is an unmanageable and fatal disease, little subject to any remedial measures, and evidently depends upon certain local or atmospherical causes. It was observed by Gartshore to be frequent among the children of women addicted to the habitual use of spirituous liquors.

It is liable to be confounded with the induration of the cellular tissue; and this error appears to be committed by Reddelin and Sybel.

Erysipelas pudendorum ulcerans.—I am under the necessity

of making another head for an affection of erysipelatous character, first noticed by George Armstrong, then well described by Dr Percival of Manchester, (Medical Ethics, p. 231,) and afterwards by Mr Kinder Wood of Oldham, (Med.-Chirurg. Trans. Vol. vii. p. 84,) for the following reasons. The infantile rose attacks indiscriminately male and female infants. The ulcerative rose attacks chiefly, if not solely, female infants. The infantile rose is not known to attack later than the second month, and is most frequent a few days after birth. The ulcerative rose attacks chiefly girls of from one to six years of age.

The attack of the disease commences much in the manner as other febrile and inflammatory disorders, viz. with chillness, succeeded by heat, pain of the head, listlessness, squeamishness, loss of appetite and thirst, furred tongue, and an inert state of the bowels. From two to three days after the appearance of these symptoms, the patients complain of heat and pain in voiding urine, or cry, scream, and struggle violently during the attempt to empty the bladder. When the parts are examined, one or both *labia* are found red or reddish-brown, raw, tender, much swelled, tense, hot, and extremely painful; and these appearances extend onwards to the *nymphæ*, *clitoris*, and aperture of the *vagina*. At the same time a serous, or sero-mucous discharge, is observed to issue from the parts.

Soon after vesications arise in the *labia* and *nymphæ*, or the tender cuticle may be immediately detached without vesication; and a raw, red surface, is exposed, which rapidly passes into ulceration with the formations of thin sero-purulent matter, and partial death of the dermato-mucous covering in points and patches.

At the same time the pulse becomes very rapid and small; the patient is irritable, restless, and sleepless, and sometimes raves on matters; and the countenance acquires a peculiar pale tint, characteristic of great constitutional disorder. The bowels are slow and torpid, and, when moved by medicine, discharge dark-coloured, slimy, offensive stools; the urine is scanty, high-coloured, and often retained in consequence of the excruciating pain felt in voiding it.

At this period one of two results may take place. Either the erysipelatous action and ulceration may stop, and granulation and cicatrization may take place; or, spreading more ex-

tensively, it may first become a large foul spreading phagedenic ulcer, which progressively destroys the external organs of generation, with great constitutional disorder, wasting, total failure of the appetite and strength, colliquative looseness, and death. The former result is most likely to take place when the case is seen early, when the affection is superficial and shows a tendency to stop, when proper applications and remedies are employed, when cleanliness is observed, and when the strength of the patient is not very much impaired. The latter result, on the contrary, may be apprehended when the patient is not seen till the ulceration is very extensive and deep, when it spreads rapidly, when irritating and stimulating applications are employed, when the flesh is much wasted, the countenance pale and contracted, and the strength much impaired.

The duration of the ulcerative Rose varies from 5 or 6 days to 17 or 23 days, or even four weeks. When the inflammation is so intense and spreads so rapidly as to induce speedily the second or sinking stage of the disease, it is then liable to terminate fatally in the course of from five to six or nine days. When the disease is protracted to the 17th or 20th day, it indicates that the disease is either milder, or the constitution of the patient more vigorous, and that there is greater chance of a favourable issue.

In some instances after the ulceration has healed, an opaque yellow mucous discharge may continue from the *vagina* and *labia* for weeks, with great wasting of the flesh, loss of strength and paleness, and a disposition to the reproduction of the disease. In other instances, after the ulceration has gone rather deep and detached the whole vaginal and labial mucous membrane, the lymph effused from granulations adheres to that of the corresponding and contiguous part of the canal, and may thus unite the opposite sides of the *vagina*, and produce obliteration of its canal. In this manner are formed some of those cases of obliterated or imperforate *vagina* recorded by surgeons as requiring operation. The occasional transit of the urine over the *nymphæ*, with their more external situation, in general obviates the chance of adhesion between these bodies. But this result has also taken place.

It is of the utmost importance, in a medico-legal view, to distinguish the true nature of the ulcerative pudendal *erysipelas*

from the effects of rape, with which it has been more than once confounded. (Percival, Medical Ethics.)

Erysipelas gangrænosum, *E. typhodes*. Gangrenous or Typhoid Rose.—Though the circumstance of termination in gangrene may be regarded as insufficient to constitute a separate form of Rose, and may be argued to imply merely a difference in the degree of the inflammation, the other characters of this variety are, nevertheless, so strikingly marked, that the usual practice of nosological and practical authors is in this instance not improper.

The Gangrenous Rose appears to have been, at various periods of history, one of the most fatal maladies incident to the human race. Engendered in the filthy and irregular habits, and imperfect and scanty food, of the middle ages, it appeared in the end of the eleventh century in France, and again in the beginning of the twelfth during the reign of Louis VII., and ravaged Lorraine with great and almost irresistible fatality. It assumed chiefly two forms. In one, after shivering or chills, alternating with partial and imperfect sweatings, some part of the person or extremities became red, hard, and diffusely swelled; then brown, livid, or violet-coloured, with great feebleness, delirium, *subsultus tendinum*, and the eruption of petechial and miliary spots; and finally, mortification of the parts originally attacked, or of those most exposed to pressure. In the other, in which it approached the characters of plague and pestilential carbuncle, after shivering, heat and raving, with intense pain of the head and back, great loss of strength, and fainting occasionally, some part of the head, trunk, or extremities, was attacked about the third or fourth day with redness, diffuse swelling, hardness of the skin, and intense searing heat, which quickly became livid, brown, and black, with the formation of dark-coloured vesications or *phlyctenæ*, black or blue stripes (*vibices*), and petechial spots. In general, during this process the patient was destroyed by the intensity of the affection of the capillary system, general and pulmonary; but, if he survived, the dead parts were detached by tedious ulceration and suppuration.

It was in Lorraine that it was denominated *St Antony's Fire*, or *Mal des Ardens*.

ETIOLOGY.—In explaining the Etiology of *Erysipelas* it is manifest that the physician must advert to two classes of causes,—the first, those which operate generally in many per-

sons, and the second, those which operate in certain classes and certain individuals.

Among the first is to be noticed the state of the atmosphere, the state of the terrestrial surface, the food of the people, and contagion.

Little doubt can be entertained that certain states of the atmosphere contribute powerfully to the production of Rose. Not only does this disease prevail more in certain seasons than in others, but in some it becomes so general that it assumes an epidemic character, and seems to spread from one person to another. Its appearance is most commonly connected with a damp state of the air, and the frequent transitions from heat to cold, generally observed in that state. I think it is more owing to this state of the atmosphere than to any contagious principle that it affects so many persons at one time, not only in the wards of hospitals, but in families, where no communication could be traced. At least I have repeatedly seen it prevailing in many isolated cases in Edinburgh, which could not be shown to have had any communication. During the winter of 1832-33, and 1833-34, when it was frequent in the Royal Infirmary, it was also very common in various parts of Edinburgh, and many of the cases admitted were examples of Rose which had originated spontaneously, and without communication with other persons labouring under the disease.

The question of the contagious character occasionally evinced by Rose has been ably investigated by Dr Wells and Dr Stevenson. The general result is, that the disease occasionally attacks successively two or more persons who have been in communication, and that possibly it may pass from one to another by some contagious property which it acquires. It may be doubted, nevertheless, whether these examples of conjunction and succession are not mere coincidences, and do not depend on the same cause.

That neither atmospheric influence nor contagion, however, alone is adequate to induce Rose is evident from the fact, that all persons are not attacked by the disease even when epidemic. The persons most usually attacked are those in whom the gastro-enteric, and especially the hepato-portal circulation is languid and inert, and liable to frequent derangement. Thus Rose is most general in plethoric females prone to corpulence, in males of feeble and relaxed habit, whether original or acquired by sedentary occupations, sloth, intemperance, and irregularity,

and in both sexes, or at all ages, while the bowels are habitually slow, tardy, and torpid, with a greasy, unctuous, or imperfectly perspiring state of the skin. The disease is also more common in those of bloated, dingy, sallow complexion than in those in whom the skin is clear and florid. In such circumstances Rose is distinguished by some foreign authors as gastric or bilious *Erysipelas*; but the truth is, that in every variety of Rose more or less derangement of the gastric and biliary organs may be recognized, and it is unnecessary to allow a common circumstance to become the character of a particular species.

In some instances Rose is observed to succeed the occasional or habitual use of certain gross or indigestible alimentary articles. Thus goose, salmon, bacon, and certain parts of fish, as the liver of the shark, and the fins of the dried salmon, have been known to be followed by an attack of Rose.

In a large proportion of cases the appearance of Rose is evidently connected with a languid and inert state of the capillary circulation. The vessels, both of the gastro-enteric mucous surface and of the cutaneous surface, becoming enfeebled, acquire a proneness, on the application of slight causes, to assume diffusive or spreading inflammatory action in the latter membrane, or, in other words, are unable to transmit their contents, and contribute to the nutrition and natural secretions of the skin, and thereby, on exposure to cold, injury, or wound, become the seat of the spreading effusive action. This seems in many instances to be the cause of Rose supervening in the course, or at the close of continued fever, in patients enfeebled by wounds, in hospitals generally, and in persons of impaired constitution.

The explanation of the Pathology of Rose consists in the determination of the question, what induces the peculiar spreading inflammation of the outer surface of the *corion*. On this subject little precise or satisfactory information has been given. When it is said that the inflammation attacks this surface, and has a tendency to spread, the mere fact is stated without assigning any reason. Some pathologists, and among others Selle and John Hunter, have maintained that the erysipelatous is a peculiar kind of inflammation, the character of which is to spread, whatever tissue it affects; and that it may affect in this manner not only the skin, but the mucous and serous surfaces, and even the filamentous tissue, in which it gives rise to the disjunctive or diffuse inflammation. In this view several cir-

cumstances show that there is some justice. But even this still leaves unexplained the peculiar circumstance of erysipelas affecting the skin.

In this difficulty, perhaps, we are to look to the disorder of the gastro-enteric and the porto-hepatic circulation as the primary efficient cause, and to that oscillation of action which physiology and pathology concur in showing to subsist between the gastro-enteric mucous surface and the surface of the skin.

In conclusion, Rose may be regarded in the light of a burn resulting from the operation of an internal cause.

TREATMENT.—The treatment of Rose, though indicated upon general antiphlogistic principles, is to be regulated by the particular form of the disease, by the nature of its causes, pre-disponent or exciting, and by the characters of the constitution of the individual.

In the ordinary acute inflammatory Rose the treatment should consist of general blood-letting, carried to such extent as to obviate capillary oppression of the brain and other internal organs, the administration of emetics in emetic and nauseating doses, especially antimonials, the administration of purgatives, and the use of the saline mixture,—with the local application of such sedatives and astringents as may moderate or check the progress of the disease, and alleviate the sufferings of the patient.

Though many have disapproved of blood-letting in the treatment of Rose, I can assert from pretty extensive trial, that in the acute inflammatory form of the disease, it is not only not injurious, but indispensably requisite. It is impossible to specify any given quantity which it may be requisite to detract; for this will depend upon the intensity of the symptoms, and the strength of the patient. But the evacuation ought to be carried to a sufficient length in extent and by repetition, to abate headach and delirium, and prevent the accession of coma, or to obviate the tendency to apoplectic death or palsy. To attain these purposes I have in general found it requisite to draw twenty-five or thirty ounces at once from a middle aged adult; and in two cases I found it necessary to detract in separate bleedings more than sixty ounces before any indication of abatement in the cerebral symptoms was evinced.

In certain cases of rose, occurring in the aged, the feeble, or the valetudinarian, and especially those convalescent from fever, general blood-letting cannot with propriety be employed. In this class of cases, if the symptoms do not yield to the

remedies soon to be mentioned, local bleeding by leeches or punctures may be beneficially employed. The apprehension of leeches aggravating the disease is often not well founded, and does not form a good reason for prohibiting their application if indicated by the symptoms.

Emetics are a very useful class of remedies in the treatment of Rose; and none more so than antimony. As the disease often depends upon morbid secretions of the stomach and *duodenum*, a full dose of an emetic, consisting of a scruple of ipecacuan and one grain or a grain and a-half of tartrate of antimony, given at the onset of the disease, will often not only mitigate the severity of all the symptoms, and abridge the duration of the disease, but will occasionally check its progress entirely. If, however, this be not effected by the means now specified, nauseating doses of tartrate of antimony should be administered during the whole course of the complaint, so long as the redness, diffuse swelling, and hardness of the skin continue. A convenient mode of exhibiting this remedy is that of solution with Epsom salts, when it produces numerous fluid stools, generally with remarkable abatement of all the symptoms; and if the diaphoretic effect be more particularly desired, the combination with the *Aqua Acetatis Ammoniae* is the best.

Next to blood-letting and an emetic at the commencement, or even without that preliminary, the most effectual and necessary of all remedies in the treatment of rose is the regular and efficient employment of purgative medicine. They are indicated for two reasons; *first*, in order to remove morbid secretions and undue accumulation in the alimentary canal, and rectify the gastro-enteric and gastro-hepatic circulation; and, *secondly*, in order to diminish and obviate the tendency to accumulation in the vessels of the brain and its membranes. The best purgatives for effecting these objects are the compound colocynth pill, alternated with calomel, the black draught, compound jalap powder, or the compound saline and antimonial saline solution. In cases in which there is reason to think that much torpor of the hepatic and portal circulation concur, calomel and antimonial powder, in doses of five grains of the former to three or four of the latter, may be given twice daily, and their operation promoted by the assistance of the compound colocynth pill.

Purgatives are not well borne in the infantile and ulcera-

tive Rose; but the bowels should in all cases be periodically evacuated.

The saline mixture (*citratis potassæ mistura*,) ammoniated mixture, (*citratis ammoniæ mistura*,) or imperial, may be given as diluents and diuretics.

Opiates should not be given at the commencement of erysipelatous attacks; but after the active symptoms are subdued by due depletion, and the disease is verging to decline, they are often very useful in abating nervous or vascular irritability and restlessness, and in restoring the actions of the skin. The best method is to combine them with antimony. If not, the thebaic pill is useful.

On the subject of local treatment much contrariety of opinion has prevailed. The practice of dusting a surface affected with Rose with flour, pease-meal, chalk, and other pulverulent substances, has been much used; and these applications must be regarded as, on the whole, harmless. They are chiefly indicated in Rose of the surface of the belly or chest, where cold applications may be injurious. The best is perhaps the compound chalk and camphor powder; but it is occasionally advantageous to vary them.

In Rose of the face, head, and upper extremities, I have for many years past found cold applications, either by means of pure water or the vegeto-mineral lotion, by far the most effectual. On the skin of the chest and belly the vegeto-mineral lotion requires to be used warm. In some instances a mixture of the vegeto-mineral lotion, with a watery solution of opium, has been employed apparently with advantage. But whether real benefit be derived from this mechanical combination or not is difficult to say. Mutual decomposition ensues; the meconate of lead is formed.

Unctuous substances have been conceived to be injurious in the treatment of Rose, and have been accused of promoting the spreading of the affection. It is probable that this is a mistake. Unctuous substances, at all events, are often applied without apparent detriment.

Among means of local depletion may be enumerated numerous punctures by means of the common bleeding-lancet or the sharp bistoury. This mode of depletion is chiefly indicated when the skin is extremely tense, hot, and painfully swelled, and when, with symptoms of cerebro-meningeal oppression,

leeches cannot be applied, or general blood-letting is inadmissible. The quantity of blood drawn by this means may often amount to twelve or fifteen ounces.

Among means employed to arrest the extending progress of the disease, perhaps none is more effectual than the plan of enclosing an erysipelatous patch in a ring of nitrate of silver. The sound skin must first be moistened with water, and the lunar caustic is then drawn along it repeatedly till it forms a line of $\frac{1}{4}$ or $\frac{1}{3}$ of an inch broad, all round the reddened patch. The effect of this is in general to resist, more or less completely, the progress of the disease along the skin; but if it continue to spread, the application of the nitrate of silver should be repeated a little farther on in the same manner.

In the treatment of the Pitting Rose, much evacuation is less requisite; and if the bowels be regularly opened, and the saline antimonial mixture exhibited, and the parts be freely sprinkled with the camphorated chalk powder, the disease generally subsides slowly but steadily.

The treatment of Infantile Rose is not much better known at present than it was in the time of Bromfield and Gartshore, and, if not absolutely empirical, it is at least not regulated by general or precise principles. Bark given internally was found by these physicians to be the most generally useful remedy; and upon the same principle the sulphate of quinine may be administered in minute but frequent doses. Of local applications, none, according to their testimony, can be always relied on. Camphorated spirit was used in several cases, and afterwards the vegeto-mineral lotion was employed in others; but neither appear to have been always beneficial.

The bowels of infants affected with this disease should be freely opened by castor-oil and calomel, in order to remove morbid secretions.

The ulcerative form of Rose requires the mildest possible local applications. The vegeto-mineral lotion seems, by its sedative and astringent properties, to be well adapted for this purpose. In both forms I have seen the resinous ointment applied freely over the parts very beneficial.

Reasoning from the analogical effects in burns, I should think that not only in the common inflammatory, but in the infantile and ulcerative Rose, the application of cotton over the inflamed and reddened surface, and maintained in its situation by mo-

derately tight bandaging, would be attended with very beneficial effects.

On the treatment of the Gangrenous Rose nothing is known with certainty. As the remote causes on which it depends take sometime to operate before they produce their specific effects, and as over these effects we have little control, unless by the medium of their causes, it is difficult, if not impracticable, to employ remedial agents with any prospect of success. The disease, in short, must be regarded as a species of poisoning, which cannot be cured without the knowledge of a direct antidote.

§. II. Bullose Fever, Vesicular Fever; *Pemphigus*, Sauvages, Sagar, Cullen, Willan. *Morta*, Linnæi, 1. *Febris Bullosa*, Vog. 41. *Febris Pemphigodes*, *Pompholyx*, Willan and Bateman. *Bullæ*, Frank. Blebs, *Pemphigus*, Hildenbrand.

Dr Stuart in the Edin. Med. Commentaries, Vol. vi. and iii. p. 73.—Dr Stephen Dickson, in Transact. Royal Irish Acad. for 1787, Vol. i.—Mr Upton, in Mem. of Med. Society of Lond, Vol. iii.—Mr Thomas Christie, in Lond. Med. Journal x. p. 385, p. 1789.—Salabert Journal de Medecine, Vol. lxxii. 1790, p. 66.—Mr Gaitskell, in Memoirs of London Medical Soc., Vol. iv.—Mr Ring, in London Med. Journal, Vol. xi. p. 235.—Michaelis, Hufeland's Journal, 3 B. S. 187.—Garn, Ibid. 6 B. and St. 359.—Hennig, Ibid. 21 B. S. 121.—Wichmann Beytrag zur Kenntniss der Pemphigus, Erfurt, 1791.—Braune, Versuch uber den Pemphigus und das Blasenfeber. Leipzig, 1795.—Dr Hall, in Annals of Medicine, Vol. iii. Art. ix. 1798.—Savary, Journal de Medecine, Vol. xxii. 1811. p. 203.—M. S. P. Gilibert, Monographie du Pemphigus, &c. Paris, 1813.—Morauchik, Dissert. de Pemphigo, Vienna, 1815.

An eruption more or less general of Blebs (*Bullæ*,) or watery bladders, may take place not only, as already stated, in Rose, but in Ague, Remittent Fever, Typhous Fever, Gastric Fevers, and even in Gout, Peripneumony, and Dysentery.

The appearance of Blebs or Vesicles in Rose is very common; and the infantile and ulcerative Rose are very generally attended with the formation of *bullæ* more or less perfect and extensive.

In *Synochus* and *Typhus*, under particular circumstances, the formation of blebs of various size is also not unfrequent; and there is little doubt that the epidemic *Pemphigus* of the French army at Prague in 1736, described by Thierry, and probably that of the Valley of Simme in Switzerland in 1752, noticed by Langhans, belong to this kind. Insulated cases of this kind have been seen by Selle and Frank; and I observed in the epidemic of 1819 an eruption of large blebs and *phlyctænæ* in a

man labouring under bad Typhus in the Fever Ward of the Royal Infirmary.

Bullæ were in like manner seen by Schroeder, Finke, and Christie in gastric fevers; and it is further to be observed, that in all the cases of alleged *Pemphigus* or *Pompholyx*, without typhous symptoms, there were symptoms more or less distinct of disorder of the gastro-enteric system.

For the reasons now specified, it must be regarded as uncertain, if not unfounded, that there exists such a disease as that described by physicians under the names of Bullose, or Vesicular Fever, *Pemphigus*, *Pemphigus castrensis*, &c. *Febris Ampullosa*, &c.; and that the Fever so denominated is only Intermittent, Remittent, or Gastric Fever, *Synochus*, Typhus, or Dysentery, with the accidental complication of an eruption of *Bullæ*, which are, therefore, not primary or idiopathic, but secondary and symptomatic. From this character, not even the disease described in 1813 by Gilibert is exempt.

The cases, on the contrary, described by Stuart, Dickson, Upton, Christie, Ring, Blagden, and Hall, in this country; by Salabert and Savary in France; and by Michaelis, Garn, Hennig, Wichmann, Braune and Morauchik in Germany, belong to a disease which presents the character of affecting the skin primarily, or at least without conspicuous disorder of the system, excepting, perhaps, that of the mucous surface of the alimentary canal. They were, therefore, referred by Willan to the head of *Pompholyx*, which he defined to be an eruption of blebs, without inflammation and without fever. He enumerates three varieties, 1st, the mild (*Pompholyx benignus*); 2d, the tedious (*Pompholyx diutinus*); and, 3d, the solitary (*Pompholyx solitarius*).

The mild Blebs, *P. benignus*, consist of a succession of transparent bladders or pushes (*bullæ*,) about the size of a pea, or sometimes of a hazel nut, which break in three or four days, discharge a transparent fluid, and heal. They appear chiefly on the face, neck, and extremities; and occur in boys in hot weather, in infants during dentition, and in young persons of irritable habit from eating acrid vegetable substances, or from swallowing a few grains of mercury. I have seen successive crops of them appear on the leg in the course of treatment for a burn.

The tedious Blebs (*P. diutinus*) are usually preceded for some weeks by languor, lassitude, headach, sickness, and pains of the limbs. Numerous red pointed elevations, with a sense of tingling, appear on the skin, and are soon raised into vesications as large as a pea within twenty-four hours, and if not broken, afterwards attain the size of a hazel-nut. When rubbed off prematurely, the exposed surface of skin is raw, sore, and reddened, and does not readily heal. These blebs continue to rise in succession on different parts of the person, and, even reappear on those first affected, so that the whole number is very great; and when the excoriations are thus multiplied a slight febrile paroxysm occurs every night, and the patient suffers much from irritation and want of sleep.

This disease affects chiefly persons of impaired strength, and is very severe in the aged. The cases recorded by authors show that it originates in different conditions of the body, but chiefly when the strength is impaired, and the functions disordered by corporeal fatigue, anxiety, low, or bad diet, intemperance, exposure to cold, &c. It is sometimes connected with general dropsy, with scurvy, pimples, and all those states in which the cutaneous capillary circulation is feeble and its secretion deranged. In some instances it has appeared after profuse sweating or unusual heat, during which cold liquors were copiously swallowed. In the instances in which it has occurred in the course of fevers, it was obviously symptomatic; for it has not only occurred at various periods and varied in duration, but it has accompanied fevers of the continued, remittent, and intermittent form, as well as arthritis, rheumatic, gastric, and other secondary fevers. It is this form which is described by Stuart, Dickson, Christie, Gaitskell, Upton, and others in the works mentioned above.

It appears from the accounts of these authors, that the fluid contained in the blebs is not ichorous, but watery, and possessing the properties of *serum*, or the fluid of blisters. According to Mr Gaitskell, who analyzed it, it is pale yellow, transparent, slippery between the fingers, like a thin solution of gum-arabic,—insipid and inodorous. With the concentrated mineral acids, and strong spirit of wine, coagulable matter in the form of white flakes is separated. The proportion of this coagulable matter was two grains in thirty-two of the vesicular liquor, or one-sixteenth. Mr Gaitskell likewise showed,

by inoculating himself with this fluid, that it was incapable of communicating the disease. He also regards it as not contagious, but does not mention any proofs of this opinion.

These facts, which I have briefly noticed, prove that the bleb eruption consists in a local inflammation of the outer surface of the corion, developed in many minute points, and spreading to a small extent from each, but not going into the corial tissue. The effect of this inflammation is, as in the case of Rose, burns, blisters, &c. the discharge of fluid, which, as it increases, elevates the scarf-skin, so as to form the blebs or pushes which constitute the external marks of the disease. They are therefore the effects of this inflammatory process of the outer surface of the skin.

The solitary blebs (*P. solitarius*) is a rare form of the disease, affecting chiefly old women. One large vesication appears usually in the night after much tingling of the skin, and rapidly enlarges so as to contain sometimes a tea-cupful of fluid; within forty-eight hours it bursts, and leaves a superficial ulceration. Near this another bleb arises in a day or two, and goes through the same course; and it may be followed by others in succession in the same manner, for eight, ten, or fifteen days.

The treatment of this disease is of two kinds, general and local.

The general treatment should be limited chiefly to the administration of suitable diet, and the exhibition of such medicines as restore or maintain the sound state of the alimentary function, and of the cutaneous secretion. Food, consisting of milk or its preparations, and the saccharine or farinaceous vegetables, with recent eggs occasionally, is the most judicious. The drink should be cooling, diluent, and unstimulating. Gentle doses of purgatives, exhibited so as to insure a mere eccoprotic operation, are useful. The decoction of bark with cordials and diuretics is said by Bateman to be advantageous; but perhaps the greatest reliance should be placed on such management of the process of digestion and excretion as will approach nearest to the state of health. The warm-bath may be used; but in some cases it appears to be followed by tingling of the skin and enlargement of the blebs. If managed so as to evade this result it will be useful.

The local treatment is confined to the application of the linseed poultice, followed by slight dressings with simple oint-

ment or basilica to the sores. In other respects it must be conducted on general surgical principles.

SECTION III.

Cutaneous inflammation commencing in circumscribed or definite points of the outer surface of the corion, and producing minute eminences or pimples (*Papulae*), which disappear gradually, or terminate in scurf or minute exfoliation of the cuticle.

When cutaneous inflammation appears in the form of innumerable minute points, which do not spread or run into each other, but in general remain distinct, it seems to be entirely different in nature from that which has been already considered as the spreading or diffusive inflammation. The simplest form under which this is observed to occur is that which consists of the minute pointed elevations named pimples (*Papulae*), which may be described as small conical eminences, surrounded with a red circle, and sometimes attended with a superficial redness of the neighbouring skin, but without definite figure. They are slow in progress, do not proceed to suppuration, and after remaining an uncertain time branny or scurfy, subside gradually, occasioning an exfoliation of the scarf-skin with which they are covered. These seem to have been the circumstances which induced Dr Willan to consider pimples as arising from inflammation of the *papillae* or conical eminences of the corion. This view is in the main just. Some of them have white summits, which seem to depend on a limited effusion of lymph, which, however, is absorbed without breaking the cuticle, or producing a scab,—a circumstance by which they are to be distinguished from vesicles. Their uncertain duration, slow progress, absence of suppuration, and termination in resolution, with exfoliation of cuticle, will enable the student to distinguish them from minute pustules, with which, at least in the incipient state, they are liable to be confounded. The term, indeed, has been used much too extensively to denote many different and sometimes opposite forms of cutaneous inflammation, (see Willan, p. 17;) and certainly many diseases, which afterwards become vesicles or pustules, appear originally in the form of pimples. But by attending to the distinctive characters which have been enumerated, an observer, even of moderate capacity, will be able to perceive the difference, and recognize the true character of this form of cutaneous inflammation. With the

restrictions now stated, only three diseases have been mentioned by Dr Willan as appearing under the form of pimples. The Gum (*Strophulus*,) the Sun-rash (*Lichen*,) and the Itching-rash (*Prurigo*.)

§. I. The Gum (*Strophulus*,) or Gown by popular use, is an infantile disease, and has been described as occurring under five forms; the Red Gum or Gown (*Strophulus intertinctus*;) the White Gum (*Strophulus albidus*;) the Rank Red Gum or Tooth-Rash (*Strophulus confertus*;) the Fleeting Gum (*Strophulus volaticus*;) and the bright glossy Gum (*Strophulus candidus*.) Their characters may be stated in the following manner.

1. The Red Gum (*Strophulus intertinctus*.) Pimples bright-red, commonly on the cheeks, fore-arms, and back of the hands, sometimes over the whole body;—usually distinct; but intermixed with red dots (*stigmata*,) and large red patches without elevation; occasionally with a few small vesicles on the hands and feet, which soon dry without breaking.

2. The White Gum (*Strophulus albidus*.) Pimples in the form of minute whitish specks, slightly elevated, sometimes surrounded with slight redness. A mere variety of the Red Gum, and occasionally intermixed with it.

3. The Rank Red Gum, Tooth-Rash, Tooth-Eruption, (*Strophulus confertus*.) An extensive crop of numerous minute pimples on the cheeks and forehead about the fourth or fifth month,—smaller, more crowded, and less bright in colour than in the Red gum. In infants seven or eight months old, they appear in the form of large irregular patches on the outside of the hands, arms, and shoulders, and are hard and close set, giving the surface a high-red colour. In about a fortnight they begin to fade and exfoliate, and gradually disappear.

A more rare form is that which appears on the legs, and spreads upwards to the loins and navel, producing general redness of the scarf-skin, which cracks and separates in large pieces, occasioning much distress to the infant. It is liable to recur at short intervals for two or three months.

4. The Fleeting Gum (*Strophulus volaticus*.) Small circular patches or clusters of high red pimples, arising and exfoliating successively on different parts of the body, sometimes attended with slight feverishness. Each patch turns brown in about

four days, and begins to exfoliate, and the whole series terminates in three or four weeks.

5. The Shining or Glossy Gum (*Strophulus candidus*.) Large pimples with a smooth shining surface, and without redness of base,—appearing of a lighter colour than the adjoining skin, generally on the loins, shoulders, and upper part of the arms;—after continuing hard and elevated for about a week, they gradually disappear. This variety may succeed any of the acute diseases to which infants of a year old are liable.

The appearance of these eruptions is connected with a weak or irritable state of the stomach and bowels, with those symptoms which denote acidity, imperfect digestion, &c.; and though they may occur at almost any time in infants of fair complexion and irritable or moveable habit, are most frequent about the period of weaning, and about the time of dentition. In some instances the appearance of one or other form of the gum may be traced to some slight derangement in the functions of the nurse or mother; any fit of indigestion, exposure to cold, mental emotion, or alarm, any circumstance, in short, which will change the nutritious properties of the milk, may be succeeded by an attack of the gum.

The management of this eruption should be simple. The disease has a tendency to run a certain course, and all that is requisite is to prevent this from being accompanied with pain or uneasiness. An occasional dose of castor-oil, or any of the antacid powders, is sometimes useful; but it is chiefly important to regulate the diet of the infant in such a manner that the action of the stomach and bowels may be as little disordered as possible. The tepid bath or tepid washing is also of use in promoting and maintaining a sound perspirable state of the skin. Exposure to cold, or immersion in cold water, must be avoided; though they cause the eruption to disappear, it is always with the effect of occasioning colicky pains, convulsion, or some other internal disorder. The warm-bath should then be resorted to with the utmost expedition.

§. II. The Sun-Rash (*Lichen*.) is an intense eruption of pimples, affecting adults, connected with internal disorder generally of the alimentary canal, terminating in scurf, recurrent, not contagious. It may occur in seven different forms;—the simple, the capillary or hair-rash, the circumscribed, the mild or severe,

the purple or livid, the tropical or prickly heat, and the wheat-rash. Their characters may be stated in the following order:

1. The Simple Sun-Rash (*Lichen simplex*.) Red pimples, preceded by slight fever, appearing first on the face and arms, and extending in three or four days to the trunk and lower limbs, with a sense of tingling, especially in the night. After continuing about a week, its colour fades, and the skin exhibits numerous scurfy exfoliations, which remain longest about the flexures of the joints. The duration of the complaint varies from ten days to three weeks. The appearance of the eruption varies in different regions of the skin. The pimples of the face are large and round, like small tubercles, as in acne; on the breast and extremities they are more pointed; and on the hands they may be obscurely vesicular. In some cases the eruption is partial, confined to the face, neck, or arms only; it appears and disappears repeatedly without terminating in scurf; and in others successive eruptions and exfoliations prolong the disease for two or three months. It must be distinguished from measles, scarlet fever, and other rashes, and from itch, with which it has been confounded.

2. The Hair Sun-Rash (*Lichen pilaris*.) a modification of the foregoing, in which the pimples appear at the roots of the hairs only. The pimples, by their itching, are sometimes converted into temporary wheals by rubbing.

3. The Circumscribed Sun-Rash (*Lichen circumscriptus*.) Pimples in clusters or patches, with a defined margin, and an irregularly circular form. Some are stationary for a week or two and disappear; others extend by new papulated borders into larger patches which coalesce. As the borders extend, the central spaces become even, but continue slightly red and scurfy; or a fresh crop of pimples may arise ere the scarf is removed. In this manner, the eruption may continue for weeks. In adults it occasionally succeeds vaccination, and has been believed to indicate the affection of the constitution by the vaccine matter. This is doubtful.

4. The Wild or Severe Sun-Rash WILD FIRE of popular usage? (*Lichen agrius*.) Preceded by feverish symptoms, which are relieved on the appearance of the eruption. Pimples in large patches of a high red colour, with redness of the surrounding skin; accompanied by itching, heat, and painful tingling, which are converted into scalding by the heat of the bed,

washing with soap, drinking wine, or violent exercise. These symptoms undergo a daily increase and remission; they are greatly diminished in the morning, and recur after dinner, or when the body becomes heated. Some small vesicles, filled with a straw-coloured fluid, are occasionally mingled with the pimples; but they are not permanent.

This disease may continue for weeks, and, in general, it fades and recurs several times ere it finally disappears. During its continuance the scarf-skin becomes harsh, thickened, chopped, and very tender and painful when rubbed. After several attacks it is liable to terminate in the moist tetter (*Impetigo*),—a circumstance by which it is distinguished from the other forms of Sun-Rash. Exposure to cold may cause its disappearance, but with the effect of inducing an acute feverish disorder, with vomiting, headach, and pain of the bowels, continuing for some days.

It is more common in women than in men, and generally occurs after long fatigue, with watching and anxiety. It is observed sometimes in dram-drinkers.

5. The Purple or Livid Rash (*Lichen lividus*.) Dark-red or livid pimples appearing chiefly on the extremities, without symptoms of fever, more permanent than either of those mentioned; sometimes with intermixture of petechial spots.

6. The Tropical Sun-Rash or Prickly Heat (*Lichen tropicalis*.) An eruption of small red pimples, with the usual characters, unattended by fever, peculiar to tropical climates. They occur chiefly in those regions of the cutaneous surface which are kept warmest by clothing, or most exposed to friction. It is attended with extreme itching, heat, and pricking, which compels the patient to scratch until the cuticle is detached. Many people have it annually, more or less, during the hottest months. It terminates in a few weeks in scurf, or small white scales. In some cases, where it is aggravated by intemperance or bad management, it is obstinate, and may terminate in ring-worm or tetter.* Cold bathing, or exposure to cold, is as injurious in this rash as in the others.

7. The Wheal or Nettle Sun-Rash (*Lichen urticatus*.) This is described by Bateman as occurring in the form of irregular red wheals, so similar to the spots left by the bites of bugs or

* Mosely. A Treatise on Tropical Diseases, and on the Climate of the West Indies. Lond. 1787. p. 15.

gnats as almost to deceive the observer. The redness fades in a day or two, leaving minute elevated itching pimples. While the first wheals are thus terminating, new ones appear in succession, until the body and limbs are spotted with pimples, which here and there coalesce into small patches. This eruption is peculiar to children, commencing sometimes soon after birth, sometimes later, and continues with great obstinacy for many months. The wheals and pimples are accompanied with intense itching, which becomes very severe during the night, interrupting sleep, and causing much loss of flesh.

The treatment of the Sun-Rash is almost entirely passive. Every thing that irritates, whether in the form of food, drink, clothing, or exposure to heat, or to cold, must be avoided. The diet should be light and digestible, the drink cooling, diluent, and unstimulating. Bateman recommends the addition of a few drops of any of the mineral acids. Perhaps this is of little consequence; and the chief object to be kept in view, is the use of such food and fluids as may insure the healthy action of the stomach and intestines. As to local applications, if the patches be limited and not extensive, the almond emulsion may be used. In the severe Rash, the litharge plaster, or rather ointment softened with oil of almonds, or the rose-pomatum, allays the heat and itching. The tepid bath occasionally will be also beneficial. Bateman recommends, in weak irritable habits, the wine of iron, and the watery solution of the tartrate of iron, for the Nettle Sun-rash in children.

§. III. The Itching-Rash (*Prurigo*) consists of an eruption of pimples of the same colour as the adjoining skin, with severe itching or tickling. It affects the whole surface of the skin under three forms, the mild (*P. mitis*), the pricking (*P. formicans*), and that of old age (*P. senilis*;) and several individual regions of the body as the prepuce, (*Prurigo præputii*), the pubes (*P. pubis*), the urethra (*P. urethralis*), the anus (*P. podicis*), and the female genital organs, (*Prurigo pudendi muliebris*). Their characters may be stated in the following order.

1. The Mild Itching-Rash (*Prurigo mitis*.) Soft smooth pimples, larger and less pointed than those of Lichen, rarely red unless from friction. The tops of the pimples are then detached, watery fluid with blood escapes, and concretes into thin black scabs. The itching is aggravated by exposure to air, and by heat, and is thus very distressing when the patient

undresses, and goes to bed. It affects chiefly young persons in the spring or beginning of summer. By mismanagement it may terminate in itch (*Scabies*.)

2. The Pricking-Rash (*Prurigo formicans*.) Appearance of pimples not much unlike the previous; but the itching is more constant, and is attended with various painful sensations, as of the creeping and stinging of insects, hot needles thrust into the skin, &c. These sensations are greatly aggravated by undressing, standing before a fire, or especially by the warmth of the bed-clothes. Friction produces redness, and raises wheals, which, however, soon subside. The pricking-rash occurs in adults at any season. It may affect the trunk and limbs, except the feet and palms; but is most copious where the dress is lightest. Its duration is considerable, extending sometimes, with intermissions, to two years or more. It is not contagious nor convertible into itch; but it may terminate in the moist tetter (*Impetigo*.)

The pricking-rash may be connected with disorder of the stomach, being preceded by sickness, heartach, and headach; or it may follow the use of stimulant animal food during warm weather, with the liberal use of wine, spirits, or fermented liquors; or of vinegar, pickles, or condiments. It is also observed in persons of spare habit and sallow complexion; in those affected with visceral obstruction, or reduced by fatigue, watching, and low diet.

Itching-Rash of Old Age (*Prurigo senilis*.) Pimples very similar to those of the last species, unless that they are larger. The itching is extreme and more permanent. It is frequent of occurrence, difficult of cure, and too often destroys the comfort of the remainder of life.

The treatment of these forms of cutaneous inflammation must be conducted on nearly the same principles, with modifications suited to the form and stage of the disease. Cathartic, sudorific, or other evacuant remedies are said to be injurious, or at least useless. The use of washed sulphur (*sulphur lotum*) with or without carbonate of soda or nitre, alleviates the irritation and itchiness, and shortens the duration of the disorder. The mineral acids are said also to be attended with good effects; and Bateman states that he found the itching diminish, and the eruption fade during the exhibition of the euchloric (oxygenated muriatic) acid, in doses of a drachm, increased gradually to three drachms, in water or any other proper vehicle. In ad-

dition to these means decoctions of sarsaparilla, bark, snakeroot (*Aristolochia serpentaria*,) and other tonic vegetables, are useful in weak languid habits. For local remedies the tepid bath, frequent washing in warm water, and especially baths of the native or artificial sulphureous waters, will be found beneficial. Sea-bathing has been said to remove the disorder;—it might be justly supposed that the warm sea-bath would be efficacious. Bateman found a diluted wash of the spirit of Mindererus (*liquor ammoniæ acetatis*) produce a speedy alleviation. Ointments and lotions of sulphur, hellebore, mercury, zinc, lime-water, &c. are seldom of much use.

The most important point, however, in removing this disease, or alleviating its symptoms, consists in the due and proper management of the diet of the patient. This ought to consist of the most simple, light, and digestible substances; for example, milk, either as it is obtained from the cow, or in the form of whey or butter-milk, ass-milk; with the saccharine or farinaceous vegetables; eggs as recent as possible; animal jelly without condiment; and occasionally fresh animal food prepared in the simplest manner either by boiling or broiling. Sauces, seasonings, and every form of pickles ought to be absolutely and entirely forbidden.

The examples of local itchiness are not, correctly speaking, allied to the Itching Rash, further than in the itchiness or tickling with which they are attended. They are not originally papular eruptions; but rather consist in alterations of the sensation of certain parts of the skin or mucous membrane in consequence of some unnatural irritation. The itchiness of the foreskin (*Prurigo præputii*) is occasioned by an altered or augmented secretion from the follicles round the *corona glandis*, and is cured by frequent washing of the part, or the use of the saturnine lotion. The itchiness of the privities (*Prurigo pubis*) arises solely from the presence of crabs, (*morpiones*, *pediculi pubis*,) which adhere firmly to the skin, and the roots of the hair. Removal of the hair, followed by sedulous washing and attention to cleanliness, is the direct and effectual remedy. They are also destroyed by the citron ointment, mercurial ointment, dusting with powder of calomel and chalk, or the application of the powder of hellebore. The itchiness of the urethra (*P. urethralis*) is symptomatic of disease of the urethra, the neck of the bladder, or of stone in the bladder. When it

depends on disease of the urethra, either in the male or female, the bougie is the proper remedy.

Itching of the *anus* (*Prurigo podicis*) may arise from ascarides in the rectum, piles, stone in the bladder, and in persons of sedentary habit or advanced in life, from a morbid state of the rectum, with a peculiar secretion, which renders the parts raw, tender, and itching. This complaint may extend to the scrotum, which becomes brown, thick, and scaly. The itching is most severe during the night, when it not unfrequently interrupts sleep. This complaint appears to be symptomatic of an unhealthy state of the mucous membrane of the colon and rectum. Do the observations of Lettsom afford any ground for the opinion, that it denotes an effort of the constitution to ward off an attack of lethargy or apoplexy, and that its repulsion by cold astringents is hazardous? *

The best remedy is calomel in minute doses, with antimony or the blue pill; the mercurial ointments, especially the citron, will diminish the morbid sensibility of the parts, and relieve the local irritation. Great temperance and rigorous attention to diet ought to be observed.

Itching of the genitals in females (*Prurigo pudendi muliebris*) may arise from the same causes as the preceding species, and also from whites and other morbid discharges of the vagina. It is most violent after the cessation of the menstrual discharge. The itching about the *labia* and *os vaginae* is constant and intolerable, demanding incessantly the relief of friction, and of cooling applications, and sometimes exciting a degree of nymphomania. The parts are generally at the same time swollen and red, covered with pimples, or aphthous vesicles.

Saturnine lotions, lime-water, the black-wash, vinegar, and oily liniments prepared with soda or potass, are useful in the milder cases; but the most active remedy is the yellow-wash, in the proportion of two grains of corrosive sublimate to the ounce of lime-water. If there are chops (*rhagades*) or exco-riations, their raw surface must be strengthened previous to the use of lotions, which occasion much smarting.

SECTION IV.

Cutaneous inflammations of the outer surface of the co-

* Observations on Certain Herpetic Affections, Memoirs of the Medical Society, Vol. iii. p. 346, 348, and 352.

tion, more or less circumscribed, affecting its secreting power, and thus producing exfoliation of the scarf-skin.

The scarf-skin (*cuticle* or *epidermis*) and nails have not yet been capable of injection, and are therefore believed to be inorganic. The scarf-skin is, however, remarked to be more sensible when thin and semitransparent than when thick and opaque, which it may be in certain regions. It is also observed, that, when it has been removed by a blister or the effects of a scald, the surface of the corion, when it has ceased to discharge fluid, becomes covered with a thin pellicle of transparent membrane, so delicate that it affords very little defence to the subjacent skin. This same transparent pellicle is observed in the skinning or cicatrization, as it is named, of cutaneous wounds. If, under these circumstances, the growth or formation of this pellicle be formed, it will be found that it is deposited, like a secreted substance, from the outer or cuticular surface of the corion. It is first deposited in a viscid or semifluid state, but soon hardens and dries. When the first and thinnest pellicle is formed, the outer surface of the corion, which never in the healthy state suspends its function of secretion, continues to deposit more of this semifluid and viscid matter, which in like manner, but more slowly, becomes firm; and successive depositions continue to be formed always beneath that last secreted, so that the cuticle in its perfect state consists of successive layers of matter secreted from the outer surface of the corion. It is not to be imagined, notwithstanding, that they can be distinguished from each other. The secreting or depositing power of the corion is a process which is incessant and uninterrupted; and after the first secreted portions become firm, others subjacent are constantly being deposited and hardened in like manner. While this process of repair is going at the surface of the corion, a process of wearing or destruction is with the same rapidity, in the healthy state, going on at the outer or exposed surface of the cuticle. A piece of black or blue cloth rubbed gently over the skin becomes quickly whitened by minute portions of scarf-skin, which are thus removed from the more recent and firmer portions. A black silk stocking drawn on the leg for a very short time, even when the skin has been carefully washed with soap and water, comes off covered with numerous thin white scales of no determinate shape,—which will be found to be minute portions of decayed cuticle ready

to be thrown off by the first slight friction. In like manner, the friction of dress, of washing, rubbing, &c. all tend to remove the most exposed portions of the cuticle. These facts show that this membrane is a secreted substance from the outer surface of the corion; that its formation or production is an incessant action; and that it undergoes a constant wearing or destruction. Such is the course of matters in the healthy state.

When the outer surface of the corion becomes diseased, its secretion is no longer performed in the same perfection or in the same manner. The effect of this is seen in the altered state of the scarf-skin, which is no longer the uniform, continuous, firm, semitransparent, membrane observed in health; but becomes broken, thickened, opaque, and divided into numerous scales. We do not know enough of the various modes in which this secretion may be deranged, nor of the varieties in cuticular disease to which it may give rise, to speak with precision on their individual forms; but it may be considered as certain, that every morbid state of the outer surface of the corion gives rise to certain unnatural conditions of the cuticle; and that every unnatural state of the cuticle depends originally on a morbid state of the outer or secreting surface of the corion. In general, this morbid state consists in some degree of inflammation, or at least it is attended with some degree of this process, but in the chronic form. In some instances this chronic inflammation is obviously the immediate cause of the derangement of secretion; but in other instances the diseased secretion continues after the inflammation has subsided. The former is observed in Leprosy (*Lepra*), and the Scaly-Tetter (*Psoriasis*); but is not so obvious in Dandriff (*Pityriasis*), which sometimes appear to exemplify the latter statement. The Fish-skin disease (*Ichthyosis*) is so chronic in general, that it is difficult to say whether it is attended with any degree of the inflammatory process; but, when its commencement can be traced, it is generally possible to recognize marks of inflammation of the outer surface of the corion.

The instances of this form of cutaneous disorder enumerated by authors are four,—the Scaly or Greek Leprosy (*Lepra*), the Scaly-Tetter (*Psoriasis*), Dandriff (*Pityriasis*), and the Fish-scale or Fish-skin Disease (*Ichthyosis*.)

§. I. Scaly Leprosy (*Lepra Græcorum*; *Lepra* or the Scale Disease,) is characterized by scaly patches of different sizes, but

having always nearly a circular form. (Willan.) It occurs under three forms,—the Common or Ordinary, *Lepra vulgaris*; the White, *L. alphoides*; and the Black, *L. nigricans*. Their individual characters may be stated in the following order.

1. Common Leprosy (*Lepra vulgaris*) commences with small, round, reddish and shining elevations of the skin, at first smooth, but in a day or two showing thin white scales on their tops. These gradually or rapidly dilate to the size of half a crown, still retaining their oval or circular shape, are covered with shining scales, and encircled by a dry, red, and slightly elevated border. In some cases the scales accumulate, and form thick prominent crusts. When these are removed, the skin appears red, shining and smooth, free from the circular lines in the beginning, but marked in the advanced stages with long deep lines, not always coinciding with those of the adjoining surface.

This eruption commonly commences on the extremities, where the bones lie nearest the surface,—below the elbow and knee, and usually on both arms or both legs at the same time. It thence extends by the formation of new and distinct patches along the arms or thighs to the breast and shoulders, and to the loins and flanks. The scalp and the hands may be affected, but seldom the face; though some scaliness appears about the outer angles of the eyes, and from the roots of the hair to the forehead and temples. In severe cases the nails become thickened, opaque, and of a dirty yellow colour, and are incurvated at the tips; their surface is also irregular, from deep longitudinal furrows and elevated ridges. It is attended with slight itching when the patient is heated by exercise or becomes warm in bed, and with tingling when the atmosphere is charged with humidity. When it is generally diffused, there is considerable redness, with extreme soreness, pain, and stiffness, impeding the motions of the limbs. It gives rise to no constitutional disorder.

2. White Leprosy (*Lepra alphoides*.) The patches are small, and seldom extend beyond the diameter of a few lines, or become confluent; the scales are more minute, and white; the eruption is confined to the extremities; and it is most common in children.

3. Black or Brown Leprosy (*Lepra nigricans*.) The patches are dark or livid, especially in the margin; the scales are more

easily detached; the surface remains longer raw and tender, discharging a bloody serum till a new incrustation is formed; and it occurs in persons whose occupations expose them to the vicissitudes of the weather.

The causes of Leprosy are involved in obscurity. It occurs in the persons of the inhabitants of large towns, as London and Edinburgh, without much reference to modes of living, habits of cleanliness, or local situation. Willan ascribed it to cold and moisture, and dry filthy substances on the skin. It is not, however, more frequent among bakers, millers, laboratory men, and others who work among dry powdery substances, than among those who are not exposed to such causes; and there are innumerable persons in such situations who live in incessant filth, and who yet are not affected by this disease. On the other hand, Bateman observed a considerable number of cases in young ladies, and in persons in respectable ranks, by whom every attention to cleanliness was scrupulously paid. I have remarked it to be not uncommon among young women of fair complexion, and full habit, but otherwise in good health; and have rarely seen it in the lean, the spare, or the dark-coloured. It is certainly not communicable by contagion; but some circumstances indicate that it depends on hereditary predisposition.

Leprosy is a perplexing complaint to treat, and the multiplicity of remedies which have been recommended from the earliest times, puzzles the practitioner considerably. Experience has, however, shown that, by accommodating the remedies to the several degrees of the malady, he may at length succeed in removing it. When the skin is not much inflamed, as happens in the White and the milder cases of Common Leprosy, gently stimulant remedies are useful. The warm bath, especially of sea water, frequently used, with moderate friction, contributes to remove the scales, and render the skin more perspirable and softer. When the eruption is confined to the extremities, local washing and friction are sometimes sufficient. The sulphureous waters of Harrowgate, Leamington, Crofton, and similar springs, internally and externally, are likewise efficacious.

In more obstinate forms of the disorder, when the scales adhere tenaciously, or accumulate in crusts, lotions of diluted alcohol, of sulphuretted potass, or the decoction of the leaves and twigs of bitter-sweet (*Solanum dulcamara*,) and, according

to Plenck, of the inner bark of the elm (*Ulmus campestris*,) will facilitate exfoliation; and embrocations containing a portion of the solution of potass, or of spirit of salt (hydrochloric acid,) will soften and loosen the crusts. After this the pitch ointment, citron ointment, either alone or diluted with saturnine ointment or cerate, or a lotion of corrosive sublimate, will be useful in restoring the corion to its natural state. The ointments may be applied at night, and washed off in the morning by the ordinary means of tepid ablution. The sulphurous vapour bath properly administered is very efficacious.

At the same time, means may be used through the medium of the general circulation for acting on that of the skin. For this purpose, the arsenical solution of Dr Fowler, in doses of four drops, to be slowly increased to eight, continued for a month or six weeks, according to circumstances, the pitch-pill, the solution of corrosive sublimate in proper doses, the wine of iron, or its tartritic solution, and, lastly, the decoction of the leaves and twigs of bitter-sweet (*Solanum dulcamara*,) will be employed with advantage.

In more violent forms yet of Leprosy, when the cuticle is much thickened, stiff, and yellow, and the skin and affected parts in general are red, raw, sore, and so stiff as to impede the motion of the limbs, a different and more lenient course must be pursued. The parts should be bathed with nothing stronger than tepid water, thin gruel, or at most a weak decoction of bitter-sweet leaves; or they may be anointed with cream, butter-milk, or recent lard. At the same time, the internal use of sulphur, with soda or nitre, or that of mineral ethiops (*hydrargyri sulphuratum nigrum*,) with antimony, or the decoction of bitter-sweet, will be beneficial. The caustic potass, or its solution, in doses of 20 or 30 drops, alone or combined with precipitated sulphur, and the tincture of white hellebore (*Veratrum album*,) given so as not to affect the bowels, have occasionally removed this state of the disease.

The Brown Leprosy is cured by nutritive food, with moderate exercise, followed by the use of bark, mineral acids, and sea-bathing.

§. II. Scaly Tetter (*Psoriasis*,) occurs under a considerable variety of forms, with roughness and scaliness of the cuticle, and redness of the corion. The eruption may be diffuse and continu-

ous, or in individual patches of various size and irregular figure. By this last circumstance, the want of raised and inflamed border, and by the presence of chops or fissures of the skin, (*rhagades*,) and some constitutional disorder, the Scaly Tetter has been distinguished from the Scaly Leprosy. But, notwithstanding, they seem to be so much allied as to be considered, without much violence, as different degrees of the same cutaneous disorder. It may occur either as a general or as a local disease. In the first form it presents four varieties, the Distinct Tetter (*Psoriasis guttata*,) the Diffused (*P. diffusa*,) the Serpentine (*P. gyrata*,) and the Inveterate (*P. inveterata*,) In the local form, it may occur on the lip, the eyelids, the scrotum, the foreskin, or the palm of the hands.

1. Distinct Tetter, Wild-fire, (*Psoriasis guttata*,) The patches are distinct and small, seldom exceeding two or three lines in diameter, and of irregular circumference. They may appear on any part of the body, and even on the face, where they consist merely in red roughness of the skin, and are popularly named Wild-fire in Scotland, and in some of the English counties. Its appearance is preceded by general pains and slight feverishness, and it is most common in the spring, when it may recur for years. In children it spreads rapidly over the body in two or three days; but its progress in adults is slow and gradual. It is closely allied to Leprosy in its appearance, and may be regarded as the connecting link between it and the following varieties of Scaly Tetter.

2. Diffuse Tetter (*Psoriasis diffusa*,) Large patches, irregularly circumscribed, with a rough, red, chopped surface, and very slight scaliness interspersed; tender, with a sensation of burning and intense itching, which is aggravated by external heat, and relieved by exposure to cool air. As the disorder proceeds, the redness increases; the skin is thickened and elevated, and is intersected with deep lines containing a powdery substance or minute scurf; the heat, itching, and soreness, are aggravated by the slightest friction. This form of the disease is most frequent about the face and ears, and the back of the hands; but may occur in other parts of the body, either simultaneously or successively. It commonly begins with general indisposition, which continues, with occasional sharp pains of the stomach, for several weeks, or during the course of the disease. Its duration is from one to four months, or longer;

and it is liable to return in spring or autumn, or both, for several successive years. In other cases, the disease commences in separate patches of uncertain size and shape, which coalesce until they nearly cover the whole limb.

Local instances of the diffuse Tetter are observed from local causes. Of this kind are the *Bakers' Itch*, when the back of the hand is covered with rough scaly patches, interspersed with sore chops; the *Grocers' Itch*, and the *Shoemakers' Itch*, when the palm or hands in general are affected; and the *Washer-womens' Itch*, in which the hands, wrists, and fingers, are diffusely inflamed by the irritation of soap, &c. till the cuticle cracks into chops, and separates in large plates.

3. Serpentine Tetter (*Psoriasis gyrata*.) The patches are in stripes, tortuous or serpentine, resembling worms or leeches, or bending into rings. It must be distinguished from the vesicular and pustular ring worms (*Herpes and Impetigo*.)

4. Inveterate Tetter (*Psoriasis inveterata*.) It begins in separate irregular patches, which spread and coalesce till they cover the whole surface of the body except the face, the palms of the hands, and the soles of the feet, with universal scaliness, interspersed with deep furrows, and a harsh thickened state of the skin. In this extreme degree, it makes a close approach to the common Leprosy, from which it differs only in the shape of the patches before they coalesce. It may be the ultimate state of the diffuse Tetter, and is an occasional termination of the Itching-rash of old age. It is the most severe form of Scaly Tetter.

Among the local forms of the disease, the following may be mentioned. Lip-Tetter, or Scabbed mouth (*Psoriasis labialis*.) The cuticle of the *prolabium*, especially of the lower lip, is thickened, cracks, and exfoliates, sometimes for a long period of time. It is a very common form of the disorder in young children, particularly girls, of rather fair complexion or irritable habit.

Eyelid Tetter (*Psoriasis ophthalmica*.) The scaliness occurs about the angles of the eyelids, which become red, thickened, tender, and itchy, and emit a watery discharge. It must be distinguished from the *Psorophthalmia*, which is more restricted to the *tarsi* and Meibomian follicles.

The foreskin Tetter generally accompanies the Grocers' or Shoemakers' Itch. The scrotal Tetter is produced under the same circumstances as the scrotal Itching-Rash.

The causes of Scaly Tetters are not more obvious than those of Leprosy. With the exception of the first species, it is not contagious. It can sometimes be traced to sudden and violent disorder of the stomach, or to sudden chills when the body is overheated. Such agents are probably exciting causes, which produce in individuals thus disposed this form of cutaneous inflammation, and its subsequent effects. Hereditary tendency is also observed in some instances. The distinct and the diffuse Tetters may be the sequel of *Lichen*.

In the treatment of the varieties of Scaly Tetters, attention should be given to the constitutional disorder if its presence is obvious. The bowels should be gently opened, and the diet so regulated as not to impair or derange the process of digestion. Spices, fermented liquors, pickles, or vegetable acids, must be prohibited. After this, washed sulphur, with carbonate of soda, in proper doses, with or without infusion of bark, may be administered; while the parts are washed with tepid water, or milk and water, or water charged with sulphuretted hydrogen. In its extensive and severe forms, the same remedies and the same precautions which we mentioned in noticing the treatment of leprosy may be adopted with benefit.

For the local forms of Tetters, the citron ointment, either pure or diluted, or the spermaceti ointment, carron oil, or a mixture of equal parts of carron oil and citron ointment, are perhaps the best applications. The lip-Tetter is generally very obstinate, and resists every mode of management. I have used with success an ointment with a small portion of the powder of the berries of the *Cocculus suberosus*; but it is requisite to prescribe it only to patients who can prevent it from being introduced into the mouth. The disease undergoes a spontaneous cure as the individual grows up, and acquires adult strength.

§. III. Dandriff (*Pityriasis*) is a very superficial eruption consisting of irregular patches of thin scales, which repeatedly exfoliate and recur, but never form crusts, and are accompanied with excoriations. Four varieties have been enumerated, the Dandriff of infants (*Pityriasis capitis*,) Red Dandriff (*P. rubra*,) Variegated Dandriff (*P. versicolor*,) and Black Dandriff (*Pityriasis nigra*.)

1. Dandriff of Infants (*Pityriasis capitis*.) Slight whitish scurf along the top of the brow and temples, but in larger, flat, separate, semitransparent scales on the hind-head. A similar

eruption occurs on the scalp of aged persons. It disappears under regular washing with soap and water, or with an alkaline or weak sulphurous lotion. If the hair is thick, it must be removed. If neglected it may degenerate into scalled head, (*Porrigo*.)

2. Red Dandriff (*Pityriasis rubra*.) The scarf skin is at first red and rough, but soon becomes mealy or scurfy, and exfoliates, leaving a similar red cuticle beneath, which undergoes the same process; the scaliness increasing as the exfoliation is repeated. At the same time the surface is dry and imperspiring, itchy, and stiff. When the redness and scales disappear, the patches remain yellow, or sallow-coloured. This process, which is the result of inflammation of the outer surface of the corion, in circumscribed spots, is liable to be repeated at short intervals, and is attended with general languor and restlessness. It is most frequent in advanced life.

It disappears under the use of antimonials combined with wood decoction, and the warm sea-bath. Bateman has seen it relieved by small doses of the tincture of white hellebore (*Veratrum album*). It rarely requires local applications; but a lotion or ointment containing borax, alum, or sugar of lead, or a liniment, consisting of equal parts of carron oil and citron ointment, is useful in diminishing itchiness.

3. Variegated Dandriff (*Pityriasis versicolor*.) It appears on the breast, pit of the stomach, or inside of the arms, in brown patches of different shades, variously branching and coalescing, and interspersed with portions of the natural hue. It thus gives the affected parts a checquered or variegated appearance. The patches are not always scurfy and rough, and have no elevated border. It is a disease of little moment, and is merely troublesome in being attended with slight itching on exposure to heat. Its dingy or copper colour, however, causes it to be sometimes mistaken for nephritic eruptions.

Internal medicines have no great influence on this disease. Water containing chlorine gas is said to be efficacious; and the pitch pills have been proposed for its removal. Of external applications, lotions consisting of rectified spirit and spirit of salt (hydrochloric acid,) or the caustic potass, are successful in removing it; and sea-bathing is both remedial and preventive; but the most certain remedy is the sulphur vapour bath, which, properly administered, I have never known it resist.

4. Black Dandriff (*Pityriasis nigra*). Willan observed in children born in India, and brought to this country, a papulated state of the skin terminating in black discoloration and slight furfuraceous exfoliations. This disease, which is a form of Dandriff, affected sometimes half a limb, as the arm or leg, and in other cases was confined to the toes.

§. IV. Fish-skin disease (*Ichthyosis*) consists in a thickened, hard, rough, and in some cases horny condition of the integuments, with tendency to scaliness, but without the deciduous exfoliations, the distinct and partial patches, or the constitutional disorder of leprosy and scaly tetter. The instances of this disease have been referred to two heads, the Simple Fish-skin (*Ichthyosis simplex*) and the Horny Fish-skin (*Ichthyosis cornea*).

1. Simple Fish-skin disease (*I. simplex*). In the commencement the scarf-skin is thickened, hard, and discoloured, so as to appear at a distance as if soiled with mud or filth. When farther advanced, the thickness, hardness, and roughness increase to wartiness, and its colour is nearly black. The roughness, which communicates to the finger the sensation of a file or the roughest chagrin, is occasioned by innumerable rugged points, into which the surface is divided. These hard prominences (*papillæ*) differ in form and arrangement in different regions of the skin, and in different stages of the complaint. Some appear to be of uniform thickness from their roots upwards; others have a short narrow neck, and broad irregular tops. The former occur where the skin when healthy is soft and thin; the latter where it is coarser, as at the elbow, and kneepan, and thence along the arms and thighs. On some parts of the extremities, especially about the ankles, and sometimes on the trunk, these scaly excrescences are flat and large, and occasionally imbricated like the scales of carp. In other cases they appear separate, being intersected by whitish furrows.

These changes appear in large continuous patches, which cover the greater part of the body, except the flexures of the joints, the inner and upper parts of the thighs and the spinal furrow. The face is seldom much affected; but the breasts in the female may be entirely encased in rugged cuticle. The whole skin is dry and imperspirable; and the cuticle of the palms of the hands and soles of the feet is thickened and brittle. This disease may commence in childhood or early infancy without unknown cause; but it appears to depend on hereditary disposition.

This affection is little under the influence of medicine. Washing with warm water, and frequent immersion in the warm bath, with friction, removes the scales, and prevents their subsequent formation, but does not render the cuticle healthy or soft and perspirable. The outer surface of the corion is too completely diseased to be much affected either by these means or by the sulphurous baths. The pitch pill, on the authority of Bateman, occasions the rough cuticle to waste and fall off without external applications, and to leave the subjacent skin sound. The arsenical solution has been also proposed. The sulphurous vapour-bath may be expected to be useful.

2. Horny Fish-skin Disease (*Ichthyosis cornea*). To this head have been referred cases of a horny state of the integuments, sometimes local, but extending in other instances over the whole body, and of hard excrescences unconnected with a general morbid state of the cuticle. These excrescences are improperly termed *horny*; for they are of cuticular origin and growth, and consist of a laminated callous substance, contorted and irregular in shape, and not unlike isinglass in appearance and structure. They originate from various local diseased states of the skin or its appendages, as from warts, encysted tumours, steatomas, &c. Most of these examples of hard excrescence occurred in aged persons, especially females. In other respects they are an object of attention to the surgeon only.

SECTION V.

Cutaneous Inflammations originally affecting the outer surface of the *corion*, circumscribed, definite, or punctuate, producing effusion of a fluid at first pellucid, afterwards slightly opaque, with elevation of cuticle, with or without further affection of the corial tissue.

Inflammation may be developed in many minute points of the *corion* simultaneously, and be limited to these points, so that the process shall not spread, but be terminated by the formation of a pellucid fluid, serous or sero-albuminous, at the points of original action. If this fluid continue pellucid or semitransparent, or does not become quite opaque by the predominance of serous fluid, the points at which the inflammation takes place will be vesicles. Inflammation may be developed in several spots or points of the corion simultaneously or successively, and may still be confined to these spots, so that the

process spreads or diffuses itself only in proportion as it affects the corial tissue, and terminates in the effusion or secretion of a fluid which is at first pellucid, but afterwards becomes opaque, and finally hardens into a thick crust or scab. The latter circumstance probably depends on the predominance of albuminous matter, produced by secondary inflammation of the corion or its substance. To the former head belong the Miliary Eruption (*Miliaria*), Shingles (*Herpes*), Heat-Spots (*Eczema*), and perhaps the Lenticular Chicken-pox. To the latter must be referred the Limpet-shell Scab (*Rupia*), and the Cow-pox Vesicle (*Vaccinia*), when it is artificially produced in the human subject.

§. I. The Miliary Fever or Eruption; the Rash or Millet-seed Rash; La Miliare, Le Millot, La Suetie, (Gall.) Der Friesel, Germ. Fryzle, Prosowa wysypka Polon. *Mirola*, Taurinensibus. *Febris Esserosa*, Zacuti Lusitani. *Febris Purpurata rubra et alba Miliaris*, Hoffmann. *Febris Puerpera seu Miliaris*, Juncker. *Miliaris Nova Febris*, Sydenham, *Schedula Monitoria*. *Miliaris benigna, maligna, recidivans, Boia, critica, lactea, sudatoria, &c.* of Sauvages. *Miliaria* of Cullen and Willan; *Cerchnasmus*, Ploucquet.

Neucrantz de *Purpura Liber Singularis Lubec*, 1648.—God. Welsch, *Hist. Med. novum istum Puerperarum Morbum Continens qui ipsis der Friesel dicitur*. Lipsiæ, 1655.—Hamilton, *De Febre Miliari*, 1710.—Salzmann, *Historia Febris Miliaris Albæ Argentoratum et Vicinium ante Viennium infestantis*. Argent. 1736.—Quesnoy, *L'Art de Guérir par la Saigné*. Paris, 1736.—Barker, *Observations on the present Epidemic Fever*. Lond. 1741.—Fantoni *De Febr. Mil.* 1747 and 1762.—Fordyce, *De Febr. Mil.* Lond. 1748.—Al-lioni, *de Miliarium Origine Progressu, Natura et Curat.* August Taurinor, 1758. Edit. alt. 1792.—De Haen de *Divisione Feb.* 1760, et in *Rat. Med.* passim.—Collin ad Baldinger de *Miliar.* 1764.—Fischer, *De Febr. Mil.* 1767.—Gastellier, *Essai sur la Fievre Miliare*. Paris, 1773.—*Sur la Fievre Miliare des Femmes en Couches*. Montarg. 1779.—Kreysig, *Abhandlung uber das Scharlachfieber nebst Beschreibung einer sehr Bosartigen Friesel Krankheit*. Leipzig, 1802.—Hufeland's *Journal*, 13 Band, 3 St.

The Millet-seed or Miliary eruption consists in the appearance of innumerable minute elevations, generally with white summits, upon the skin of the trunk and extremities, which is more or less vividly red,—preceded and accompanied with fever, oppression of the respiration, and more or less anxiety, with profuse sweating, generally more or less rank and fetid.

It has been the subject of keen controversy among physicians whether the miliary eruption was known to the ancients; but

it is now generally believed that Triller has succeeded in proving that it was known to Hippocrates. It must, however, have been either forgotten, or confounded with other diseases during the middle ages; for, excepting some uncertain notices by Zacutus Lusitanus and Roderic a Castro, it is not mentioned till the middle of the seventeenth century, when it nearly about the same time attracted the attention of La Riviere in France, and Neucrantz and Welsch in Germany,—the former on occasion of an epidemic at Lubec in 1648, the latter in consequence of one at Leipsic in 1652. It is mentioned by Sydenham in 1664 as having then prevailed several times in London. Its appearance in Strasburg in 1734 was described by Salzmann; and soon after it attracted the notice of Quesnoy in Paris, and Barker and Fordyce in London. It was soon after described by Fantoni, very elaborately by Allioni and by Gastellier, and more recently by Kreysig as it appeared in Wittemberg in 1801. The best systematic account is that given by Borsieri.

The appearance of the miliary eruption is almost invariably preceded by a sense of cold more or less intense and general, not unfrequently distinct shivering, with epigastric anxiety, oppression of the chest, sighing, limited respiration, restlessness, and a sense of great feebleness and faintness. The sensation of cold or shivering is succeeded in the course of three or four hours by heat and sweating, without diminution, and rather with aggravation of the symptoms of pectoral oppression and epigastric anxiety, with short, limited, irregular, panting and sighing breathing, proceeding, as it were, from a sense of weight under the *sternum*, jactitation, a sense of internal heat, wandering pains, and with tremulous motions or cramps of the hands and calves. The sweat in general emits a singularly rank acid odour. At the same time the pulse is generally rapid, small and feeble, in a few cases hard, often variable, and irregular, or intermitting after each ninth, twelfth, and sixteenth beat. The tongue is not unfrequently clean and moist, but tremulous, and the thirst is intense.

When the assemblage of symptoms now specified has continued for a time, varying in duration in different individuals and different epidemics from one day to the fifth, sixth, or even the twenty-first, from the outset of the disease, a degree of itching or pricking is felt in general at first about the sides of the neck, at the mammary regions, at the epigastric, or at the

inner surface of the arms ; and the surface of these parts is soon found to be diffusely red, rough, and irregular, with numerous minute elevations not larger than pin-heads. Though the surface thus occupied is at first generally reddened, in a short time the summits of the minute bodies become of a pearly white, by reason of the elevation of the cuticle by a slightly opaque sero-albuminous fluid, when the general redness of the part or parts is less vivid. In the course of a day or two, other parts of the surface present the same appearances ; and, as new crops of red elevations appear and present pearly whitish summits, of those which broke out first, the fluid dries, and the cuticle drops off opaque and dead, forming an extensive desquamation. In some instances, in which the fluid is so thin and serous that it does not coagulate readily to form the basis of new cuticle, it constitutes a thin serous fetid fluid, which, with the red raw surface, is liable to pass into bad excoriation. In some instances it proceeds to suppuration.

The early stage of the eruption now described, in which the skin is red, rough, and irregular, constitutes the Red Miliary Eruption (*Miliaria Rubra*) of authors ; the second stage, in which these bodies present white pearly-coloured summits, constitutes the White Miliary Eruption (*Miliaria Alba*) of authors ; the third is the Serous or Aqueous Miliary Eruption (*Miliaria Serosa vel Aquosa*;) and the fourth and last is the Milky or Purulent Miliary Eruption (*Miliaria Lactea vel Purulenta*, Puzos.) There is therefore no foundation for distinguishing these forms into different species, as has been done by Hoffmann and Cullen, since the appearances made the foundation of distinction take place at different stages of the same disease, and all may be seen united in the same cases, according to the relative progress of different patches of the same eruption. Nor is there reason, therefore, for representing one stage of the disease as more or less benignant than another.

Such are the general characters of the Miliary eruption, and from which it indisputably follows, that it appears like a diffuse red rash, which speedily becomes surmounted by numerous vesicles. The eruption seldom attacks the head or face, and is generally confined to the neck, breast, mammary and submammary, and epigastric regions, and the inner surface of the loins and legs. In some instances the proper vesicles of the eruption are accompanied or intermingled with the appearance of

small blebs or pushes (*bullæ*.) The duration of the eruption is uncertain, and depends upon the treatment and the constitution of the individual. In ordinary circumstances, after three, four, or seven days, the red surface becomes less vivid and rough, the cuticle is thrown off in scales, or with the dessicated fluid in thin crusts, and vesicles ceasing to appear, the skin recovers its natural characters. In some instances, however, upon occasion of any heat or febrile disorder, vesicles may reappear in some of the former situations. Miliary vesicles at the junctions of the skin with the mucous surfaces are liable to degenerate into *aphthæ*.

The terminations of Miliary fever vary according to the treatment, and the disease with which it is connected. If it have been induced by a heating regimen, or be connected with inflammation of the peritoneum or womb, it is very likely to terminate fatally, and, at all events, its termination will depend on the intensity of the primary disease, and the degree in which that is under the influence of remedies. The principal unfavourable symptoms are extreme frequency and smallness of the pulse, rapidity and panting of the breathing, with sighing and much heaving of the chest, profuse sweating, exhaling a sour rank odour, delirium, *subsultus*, and *coma*.

Morbid anatomy discloses nothing peculiar regarding the state of the internal organs in persons cut off by Miliary Fever. The Berlin physicians found the vessels of the brain turgid with blood; Hoffmann found them loaded with clotted gore; and Allioni found nothing but the veins of the head very much distended with blood. Bianchi found the womb inflamed.

ETIOLOGY.—It is now well ascertained by the observations of De Haen, during the controversy between Collin and Baldinger, that the Miliary Fever and eruption is not a primary disease, but is the effect of any state of the system which induces, with great feebleness of the circulation, heat of the skin, and extreme relaxation of that tissue and its capillaries. Thus miliary eruptions may take place in ague, remittent fever, typhous fever, gastric fever, catarrhal fever, puerperal fever, and puerperal *hysteritis* and *phlebitis*; in measles, scarlet fever, in pleurisy, *peritonitis*, and in rheumatism, when the patients are kept hot, or treated by the too continued use of sudorific medicines; in gout, and in short, in any disease in which there is either much cutaneous heat, or this is aggravated by the heating alexipharmic medicines, or the stimulant sudorific system.

The appearance of the Miliary Eruption is often connected with manifest disorder of the gastro-enteric mucous membrane, indicated by nausea, or vomiting of bilious matters, acid eructations, flatulence, constipation, or diarrhœa, or the insensible state of the alimentary canal to purgatives.

In some instances a Miliary eruption is observed to take place towards the termination of acute inflammatory attacks, as *bronchitis* and pleurisy, apparently with favourable effect, and the eruption is then in some degree critical.

The Miliary Eruption is most common in marshy districts, during the spring, and in persons of originally feeble and relaxed habit, or who have been rendered so by previous disease. Hence it is common not only in the diseases already enumerated, but several of the hemorrhages, as in women who have laboured under *menorrhagia* or uterine hemorrhage, and in men enfeebled by wounds received in the field, or who have been largely blooded for the treatment of peripneumony or pleurisy. It is said to have taken place after the use of mercury. But cases of this kind have evidently been examples of *Eczema*. It has occasionally been ascribed to the operation of contagion; but this seems to be a mistake. It may be endemial, in consequence of local causes, and epidemic, in consequence of atmospheric causes; but there is no evidence to show that it is ever contagious.

The Miliary Eruption must be distinguished from the Petechial, from Nettle-Rash, from Scarlet Fever, from Pemphigus, and from *Herpes* and *Eczema*.

TREATMENT.—The Treatment of Miliary Fever and Eruption consists principally in withdrawing the Causes from the concurrence of which it has arisen, or in counteracting their operation, and in diminishing the morbid heat and sensibility of the skin.

The first object is to be accomplished by placing the patient in a cool chamber, by diminishing the number and weight of the bed-clothes, by frequent changes of personal and bed-linen, and by the use of cooling, if not cold, diluent drinks. All stimulating, spirituous, or vinous drinks must be abandoned; and the patient should employ the subacid or acid fruits, or watery liquors acidulated by these. The direct application of cold water to the surface will in general be unnecessary; but it is always proper to expose the surface freely to cool or even cold

air : and spunging with tepid water, either alone or with a little vinegar, will be extremely useful in abating the sense of morbid heat, and languor, and oppression.

Under the use of the measures now mentioned the heat of the skin will gradually abate, and its morbid sensibility and relaxation will disappear. But it may be proper at the same time to attempt this more effectually by the administration of laxative doses of the neutral salts or the milder purgatives, and the use of the mineral acids in small doses. The sulphuric acid, either in the simple diluted form, or in that of the elixir of vitriol, is a valuable palliative for the symptoms now specified.

For the extreme and alarming state of feebleness attendant on the Miliary fever, several foreign authors have bestowed great commendations on such agents as musk, musk and cinnamon, and camphor. Such means I regard as utterly inadequate to the end proposed. The languor and faintness are entirely symptomatic, and, as soon as the temperature is diminished, in general abate. Under all circumstances, the safest tonic is cool fresh air, or the gradual and gentle administration of cold water, and cold drinks generally.

It has been above observed, that the appearance of the Miliary eruption is often connected with a deranged state of the gastro-enteric mucous membrane,—in other words, with some degree of gastric fever. If the mild laxative doses of cathartics be inadequate to remove this state, it will be proper to employ the means specified in the treatment of that disease, p. 305, especially *enemata* repeated until the symptoms of acidity, eructation, or bilious vomiting disappear.

Local bleeding and blistering have been employed by some for the removal of particular symptoms ; and it is even stated, that, in the Miliary epidemic of Novara of 1755, all those who were not bled from the system were cut off by the disease. This merely shows that it was complicated with, or arose from, a local inflammation which required the use of the lancet. The truth is, that the Miliary eruption, being symptomatic, must be treated entirely according to the nature of the affection on which it depends. In one epidemic it may be requisite to bleed from the arm, in another to abstain from all medical interference. The best rule is not to attend much to the eruption, unless to see that, with the sweating, it do not impair the powers of the patient.

§. II. Fret, Shingles, Ringworm, *Herpes*.

This name is limited in modern nomenclature to an eruption of vesicles, preceded in general by fever, passing through a regular course of origin, growth, maturation, and decline, and terminating in about ten, twelve, or fourteen days. The vesicles arise in distinct but irregular clusters, appearing in quick succession, are close set on an inflamed portion of skin, which extends beyond the margin of each cluster, and are accompanied with scalding heat, tingling, and sometimes deep-seated pain in the parts affected. The fluid of the vesicles, at first clear and colourless, becomes gradually opaque and milky, and finally concretes into scabs. In some cases a profuse discharge takes place, and tedious ulcerations ensue. The disease may assume six different forms; 1. The Vesicular (*Herpes phlyctænoides*;) 2. The Shingles (*Herpes Zoster*;) 3. The Annular or Herpetetic Ringworm (*Herpes circinatus*;) 4. The Mouth or Lip Fret (*Herpes labialis*;) 5. The Fore-skin Fret (*Herpes præputii*;) and, 6. The Party-coloured or Variegated Fret (*Herpes Iris*.)

1. Vesicular or Phlyctænoid Fret. After a slight feverish attack for two or three days, small transparent vesicles, like the miliary or irregular clusters, containing fluid colourless or brownish, appear on the cheeks, forehead, or one of the extremities, occasionally on the neck or breast, and spreading to the trunk and limbs, new clusters appearing successively for several days. When the vesicles are larger, they may appear in a single cluster, and rarely in more than two or three. The vesicular fluid becomes opaque within twelve hours; and about the fourth day the redness round the vesicles becomes dull, the vesicles break, discharge thin fluid, and dry into dark yellowish scabs, which drop off about the eighth or tenth day, leaving a red raw surface, slowly returning to its natural aspect. This process is rarely over with all the clusters before the thirteenth or fourteenth day.

The feverish symptoms are not extinguished on the appearance of the eruption, but subside as it proceeds. The heat, itching, and tingling of the skin, which attend the successive clusters, are the source of much restlessness and uneasiness, especially when aggravated by external heat, or the warmth of the bed-clothes.

This eruption occurs in its miliary form, when it spreads

sometimes over the greater part of the person, in young robust people, who generally ascribe its origin to cold. In more partial forms it occurs in those persons who are subject to headaches and local pains, connected with derangement of the alimentary function. In other respects its causes are unknown.

Shingles. (*Herpes Zoster. Zona. Cingulum. Circinus*, Plinii.) The Belt or Girdle (Die Feuer-Gürtel of the Germans.)—After two or three days of languor, shivering, loss of appetite, sickness, headach, and frequent pulse, with tingling, heat of the skin, and shooting pains through the epigastrium, a particular sense of scalding and itching is felt in some part of the trunk, which is found covered with red irregular-shaped patches, each containing numerous minute elevations clustered together. These elevations are vesicles, which within twenty-four hours enlarge to the size of small pearls, to which they are not unlike in colour and transparency. The patches or clusters, which are at first distinct, but subsequently coalesce, vary in diameter from one to three inches, and are surrounded by a narrow red border, which extends a little beyond the vesicular elevations. For three or four days they rise in succession, with great regularity, from the point where they first appeared, in the interior direction, to the breast-bone and white line (*linea alba*,) and in the posterior to the spinal furrow. It has been generally asserted, and believed from the most ancient times, that the progress of these patches is arrested at the median line, and that exceeding this line denotes a fatal disease; but Turner asserts that he has more than once seen it surround the whole body; and Bateman observed the clusters extending across the white median line (*linea alba*;) and Russell and Tulpius contradict the assertion of the ancients regarding its fatality. The direction of the clusters is generally very regularly horizontal,—that is, passing the shortest possible way from the posterior to the anterior median line, and *vice versa*; but it sometimes is oblique, passing across the shoulder like a sword-belt.

As the new clusters are appearing, the vesicles of the first become opaque, and on the fourth day acquire a milky or yellow hue, which is soon followed by a blue or livid colour of their bases, and of the contained fluid. They then coalesce, flatten, or subside, and bursting, discharge a small quantity of serous fluid, which thickens into thin dark crusts, at first

lying loosely over the contained matter, but soon becoming hard and adhering, until they drop off about the twelfth or fourteenth day. The surface of the skin is then red and tender, and the ulceration and discharge, if considerable, leave numerous scars and pits.

According to the number of clusters, the disease may continue to twenty or even twenty-four days before the crusts are exfoliated. In other instances, the surface may not be healed before the end of the fourth week.

The febrile symptoms commonly subside when the eruption is completed; but they may continue during the whole course of the disease, probably from the local irritation and smarting. In many instances the most troublesome complaint is an intense darting pain, deep-seated in the chest, which, unless allayed by anodynes, may continue to the conclusion of the disease. In other respects the disease is devoid of danger, and is attended with so little weakness, that, after the eruption is fairly established, patients are rarely confined even to the house.

The causes of Shingles are obscure. Young persons, from the age of twelve to twenty, are said to be its most frequent subjects; but I have seen it in the middle aged, and in those advanced in life. It is most frequent in summer and autumn, and seems occasionally to rise from exposure to cold after unusual heat. It has been known to supervene on bowel complaint and chronic pains of the chest, lingering after acute pulmonary disease; and, like Rose, it has been ascribed to fits of anger. It is not contagious, and may occur more than once in the same individual.

3. Annular Fret or Herpetic Ringworm. (*Herpes circinatus*.)—Small circular patches, their circumference studded with vesicles with red bases, containing a transparent fluid, which is discharged in three or four days, and thickens into little dark scabs. The central area of each vesicular ring is at first free from eruption; but it afterwards becomes dull-red, rough, and, as the vesicular eruption declines, undergoes exfoliation of cuticle for about a week, when the scabs drop off, and leave a red tender cuticle.

This is the history of a single patch. Successive series generally appear on the face, neck, arms, and shoulders, extending sometimes to the lower extremities, and thus protract the disease to the end of the second or third week. The only

inconvenience is a disagreeable itching and tingling of the patches. It is unattended with constitutional disorder.

The Herpetic Ringworm is a disease of children, and has been accounted contagious. Its appearance among several children of the same school or family at the same time, which has led to this opinion, is probably to be ascribed to the season, or some such common cause; for none of the other forms of this disease are communicable by contagion. It is possible that it may be confounded with the pustular Ringworm (*Porrigo scutulata*,) which is contagious.

In warm climates, where all the species of Fret are violent and tedious, a very severe form of the herpetic ringworm prevails. The patches enlarge by extension of the vesicular margin; the vesicles terminate in ulcers sometimes of considerable depth; and, while these are healing, a new circle of vesicles arises beyond them, which pursues the same course, and is succeeded by another circle exterior to itself. In this manner the disease proceeds to a great extent and for a long time, the internal area of the ring healing, while the vesicular circumference is extending.

4. Mouth-Fret, Lip-Fret, (*Herpeslabialis*.) A vesicular eruption upon the edge of the upper and lower lip and the angles of the mouth, forming a semicircle or circle round the mouth by the successive rising of vesicles, is very common, and has been described by the oldest writers. Their fluid is at first transparent, but in twenty-four hours becomes yellowish and turbid, and finally puriform. The lips become red, swollen, hard, stiff, and sore, with much smarting heat, which continues for three or four days, when the fluid is discharged, and thickens into dark scabs. The swelling then subsides, and in four or five days more, the crusts drop off,—the whole duration of the complaint being from ten to twelve days.

The Mouth-Fret may be idiopathic, when it is preceded by shivering, headach, pains of the limbs and stomach, with sickness and general languor; and may be accompanied by a similar eruption of vesicles in the tonsils, uvula, and membrane of the throat and cheeks, with pain and difficulty of swallowing. These, when they break, form slight excoriations, but heal about the eighth or ninth day, as the scabs of the external vesicles are drying and dropping off. In these circumstances, the disease is ascribed to cold, fatigue, or disorder of the stomach.

Most frequently, however, the Mouth-Fret is symptomatic of various affections of the gastric and intestinal organs, or of some general febrile disease in which these are much affected. In this manner it occurs in cholera, in dysentery, peritoneal inflammation, or even in severe catarrhs; it may take place in agues; and it is a common termination of the bilious fevers either of this country or of hot climates, of yellow-fever sometimes, and of continued fever with inflammatory symptoms. In all these circumstances it is generally critical; for the severe symptoms of the original disease are alleviated or disappear.

5. Foreskin-Fret (*Herpes præputialis*.) After heat and itching of the foreskin, one or two red patches, about two or three lines in diameter, appear, presenting five or six minute vesicles, which, though transparent, are so thin as to appear red like the basis on which they stand. In twenty-four or thirty hours they enlarge and become opaque; and on the third day cohere, and look like minute pustules. If seated on the inner surface of the foreskin, as they usually are, they commonly break about the fourth or fifth day, and form on each patch a small ulcerated sore, which has a white base, slightly raised edges, and discharges a little turbid serum. If the inflaming and suppurating process be not disturbed by irritating applications, healing commences about the eighth or tenth day, and is completed by the twelfth or thirteenth, when the scabs drop off spontaneously. This form of disease may be mistaken for chancre, especially if at first irritating substances, as blue-vitriol or lunar caustic, be applied.

If the vesicular patches are seated on the outer surface of the foreskin, their duration is some days shorter. The vesicular fluid dries about the sixth day into one or more small hard-pointed scabs, under which repair takes place, and is completed on the ninth or tenth day, when the scab spontaneously drops off.

The causes of this disease are not well known. Mr Pearson is inclined to ascribe it to the previous use of mercury. It also occurs in individuals who are not attentive to personal cleanliness.

6. Party-coloured Fret (*Herpes Iris*.) Small circular patches, each composed of concentric rings of different colours, on the back of the hands, the palms and fingers, or the instep,—appearing first like a red rash, afterwards terminating in vesicles. The patches attain their full size, which is that of a sixpence,

in eight or nine days, when the centre is prominent, and the vesicular circles distended with fluid; in two days they begin to decline, and disappear in a week. The central vesicle is yellowish-white; the first ring brownish-red; the second of the same colour as the centre; the third, which is narrowest, is dark-red; and the fourth and outer ring (*areola*,) which does not appear till the seventh, eighth, or ninth day, is light-red, which is gradually lost in the surrounding skin.

The Party-coloured or Variegated Fret has been observed in young persons only, is unconnected with constitutional disorder, and has not been hitherto traced to any probable cause.

The different forms of the Fret-eruption run through a determinate course, which cannot be controlled or accelerated by medical means. They require little or no management, unless there is constitutional irritation, when the bowels may be gently opened, and the diet may be restrained to food of the lightest kind. A little simple ointment, or washing with milk and water, is perhaps the only local management requisite. In the Herpetic Ringworm, solutions of blue-stone, green vitriol, or of alum, or borax, have been recommended; but in general the less they are interfered with they heal more rapidly.

§. III. Heat-Spots, Mercurial or Red Fret, &c. (*Eczema*.) This disease consists in a punctuate inflammation, terminating in an eruption of minute vesicles, close-set, without much redness of their bases, and without primary fever. It has been observed in three different forms, the Heat-Spots (*Eczema solare*,) the Gall (*E. impetiginodes*,) and the Mercurial or Red Eruption (*E. rubrum*.)

1. Heat-Spots (*Eczema solare*.) After exposure to the direct rays of the sun, an eruption of small vesicles, slightly elevated, on the face, neck, or fore-arms of women, but especially the back of the hands and fingers,—thickly set in general, and accompanied with heat and tingling of the parts. The vesicles contain a thin whey-like fluid, or sometimes a brownish lymph. On the fingers they are attended with swelling; on the upper part of the arm, or the breast, neck, or shoulders in females, they may be surrounded with a red circle; and in men of sanguine temperament they may be mixed with hard pustules (*phlyzacia*) which suppurate slowly.

The eruption is successive without regular period of duration or decline; but may continue two or three weeks without

internal or general disorder. The vesicular fluid becomes milky, and is absorbed or dried into brown scales, or into brownish-yellow scabs, which drop off after some days. But successive eruptions in the meantime appear, and go through the same course; and in some persons the disease may be prolonged for many weeks; or may continue till autumn or winter, and terminate in the Moist Tetters (*Impetigo*.)

2. Gall. (*Eczema Impetiginodes*.) This is a local form of the disease produced by the direct application of irritative substances. It consists in small separate vesicles or vesicular pustules (*Psydracia*,) slightly elevated, attended with pain, heat, smarting, and sometimes intense itching. When they burst, the fluid which they discharge irritates the surrounding skin, which becomes red and rough, while the cuticle becomes thick and cracks as in Tetters, the appearance of which it may assume by the formation of true pustules. In short, this eruption is vesicular, vesiculo-pustular, or pustular, in different individuals, according to circumstances. Of this kind is the *Grocer's Itch*, produced by the irritation of sugar, the bricklayer's eruption by that of lime, and various forms of punctuate inflammation of the skin, resulting from the application of mercurial plasters, tartar emetic, the oil of cashew nut, Indian varnish, arsenic, valerian-root, and even the common blistering ointment in some persons.—The local pain and irritation from such eruptions are sometimes very severe; but no constitutional derangement in ordinary cases follows.

3. Red-Gall, or Mercurial eruption (*Eczema rubrum*; *Eczema mercuriale*; *Erythema mercuriale*, Spens and Marcet; *Hydrargyria*, Alley; *Erythema ichorosum*, Marcet.) Though this form may occur without obvious cause, or after exposure to cold, it is generally occasioned by the irritation of mercury in peculiar constitutions. After a sense of stiffness, burning heat, and itching, generally about the upper and inner part of the thighs, the folds of the scrotum, or the groins, or the arm-pits or bend of the arms, or folds of the neck, the surface becomes red and rough, and innumerable minute eminences, which in a day or two prove to be vesicles, are observed to have appeared. This eruption soon spreads over the body and limbs in successive large patches, with swelling of the integuments, great tenderness of the skin, and much itching. In a few days the vesicles which appeared first become opaque, burst, and discharge a thin fetid fluid, which seems to irritate the surface over which it

passes, and leaves it red, sore, and excoriated. The quantity of this discharge is considerable; and as it becomes thicker it stiffens the linen, by which it is absorbed, emitting at the same time a fetid odour. This process takes place in successive patches of the eruption, till the whole cutaneous surface from head to foot becomes raw and tender, with deep fissures in the bends of the joint, and wherever the skin falls into folds. In many parts the fluid dries into yellow scaly incrustations, which also augment the sufferings of the patient. These circumstances have led physicians to regard the fluid of the Red Gall as of an ichorous or acrid quality; but it is well known that every animal fluid almost becomes soon fetid if in any quantity, and any fluid almost in the same circumstances would cause pain if passing over a surface of skin already red, tender, and morbidly sensible. The pulse is accelerated and the tongue is white; but the functions of the stomach are not obviously disturbed.

The duration of this disease is uncertain. If a small part of the person is affected, it may terminate in ten days; if the disorder is general, it is rarely over before six weeks, and may continue eight or ten. The scarf-skin is generally completely detached, and when the discharge ceases, lies loose, of a pale-brown colour, and finally becoming black falls off in large flakes. The new red cuticle which succeeds it, is liable to desquamate again to the third or fourth time, in small white branny scales, ere the outer surface of the corion recovers its natural powers so much as to secrete a new and durable cuticle. In some instances the hair and nails fall off; and the latter when renewed are incurvated, thickened, and furrowed, as in the scaly Leprosy.

This is the history of the more severe forms of Red Gall from mercurial poisoning in irritable habits; the milder and more local forms will be easily understood from the above description modified.

Over this disease medicine has little control. The first object is to put an end to the operation of the respective exciting causes. After this the diet should be regulated by restricting it to the lightest food, which is at the same time sufficiently nutritious. Purgatives should be given in gentle doses only to produce regular evacuation of the bowels. The mineral acids, with or without decoction of sarsaparilla, snake-root, or Peruvian bark, will be useful in maintaining strength and diminishing morbid

sensibility. The only local applications of much moment are tepid milk and water, strained gruel, or decoction of bran or of linseed. Mr Pearson recommends in the mercurial eruption the application of a cerate consisting of litharge plaster, wax and oil, spread thickly on linen rollers, and renewed twice daily. I have employed the carron oil in this affection with evident benefit.

§. IV. Limpet-shell vesicle and scab (*Rupia*.) This consists in distinct points of inflammation of the outer surface of the corion causing the secretion of a thin clear fluid, which first elevates the cuticle into a broad flat vesicle, and soon becoming opaque is discharged and hardened into thin superficial scabs. These vesicles are red at their base, and in general attended with a slow inflammation of the corial tissue. The following varieties have been enumerated; simple, prominent, and corroding (*R. escharotica*.)

Simple Limpet-shell vesicle (*Rupia simplex*.) Small vesications appearing in many parts of the body, containing at first a clear fluid, which in a few days begins to thicken, and becomes opaque and puriform. Slight ulceration of the corion takes place with a sanious discharge followed by scabbing; and when this heals it leaves the surface livid or blackish.

Prominent Limpet-Shell Scab (*Rupia prominens*.) A fluted scab is generated in the course of a single night from the basis of a vesication; this extends by the successive advancement of the red border, upon which a new scab rises and elevates the previous one, so as to form a conical crust not unlike the shell of a small limpet. If this scab, which is superficial, be rubbed off, the exposed spot is covered with an exudation which, in the course of six hours, is coagulated into a similar incrustation. The ulceration at length heals. But it may be tedious in old intemperate persons, in whom, and in young, delicate, and irritable constitutions, it most commonly occurs.

I have seen a very aggravated form of this eruption in persons who had been poisoned by the constitutional effects of repeated courses of mercury. It then gives rise to great general disorder, with much emaciation, night-sweats, and loss of strength. (See also Carmichael and Devergie.)

The Corroding Limpet-shell scab (*Rupia escharotica*), consists of vesicles on the loins, thighs, and legs of infants and children in bad health, either from previous disease or improper feed-

ing and inadequate clothing. They contain a fluid believed corrosive, and may terminate in gangrenous eschars, which leave deep scars. Among the children of the poor it is generally fatal.

The treatment of this disease is to be conducted with good, light, nutritious food, and by medicines which rectify the functions of the digestive organs, restore or maintain the secretions, and improve the general strength;—for example, Plummer's pill, Peruvian bark, sarsaparilla, and the mineral acids. Opium, either alone or with antimonials, are generally requisite to diminish morbid irritability. The best local application is the nitrate of silver in substance or lotion.

Cow-Pox; Cow-Pock. *Variolæ Vaccinæ*; Jenner, Woodville, Ploucquet, &c. *Vaccinia*, Willan. *Vaccina*, Frank; *Variola Tutoria*, Hildenbrand. Vaccine Disease; Vaccine Vesicle.

An Inquiry into the Causes and Effects of the *Variolæ Vaccinæ*, a Disease discovered in some of the Western Counties of England, particularly Gloucestershire, and known by the Name of the Cow-Pox, by Edward Jenner, M. D., F. R. S. &c. London, 1798. 4to, pp. 75.—An Inquiry concerning the History of the Cow-Pox, principally with a view to supersede and extinguish the Small-Pox, by George Pearson, M. D., F. R. S. Physician to St George's Hospital. London, 1798. 8vo, pp. 116.—Experiments on the Supposed Origin of Cow-Pox, by William Simmons, Senior Surgeon to the Manchester Infirmary, in "Reflections," &c. Manchester and London, 1798. 8vo, pp. 97.—Further Observations on the *Variolæ Vaccinæ* or Cow-Pox, by Edward Jenner, M. D., &c. Lond. 1799. 4to, pp. 64.—Reports of a Series of Inoculations for the *Variolæ Vaccinæ* or Cow-Pox, with Remarks and Observations on this Disease considered as a Substitute for the Small-Pox, by William Woodville, M. D., Physician to the Small-Pox and Inoculation Hospital. Lond. 1799. Pp. 156. 8vo.—A Continuation of Facts and Observations relative to the *Variolæ Vaccinæ* or Cow-Pox, by Edward Jenner, M. D., F. R. S. &c. Lond. 1800. 4to, pp. 42.—Some Observations on Vaccination or the Inoculated Cow-Pox, by Richard Dunning, Surgeon, Plymouth Dock, &c. London, 1800. 8vo, pp. 122.—Observations on the Cow-Pox, by William Woodville, M. D. Physician to the Small-Pox and Inoculation Hospital. Lond. 1800. Pp. 43.—Reflections on the Cow-Pox, Illustrated by Cases to prove it an absolute security against the Small-Pox, addressed to the Public in a Letter to Dr Jenner from William Fermor, Esq. Tusmore, Oxford, 1800. 8vo, pp. 47.—Aubert, Rapport sur la Vaccine on Reponse au Questions redigées par les Commissaires de l'Ecole de Medecine de Paris sur la Pratique et les Resultats de cette Nouvelle Inoculation. Paris, an ix. 1800.—Comparative Statements of Facts and Observations relative to the Cow-Pox, published by Drs Jenner and Woodville. 4to. Lond. 1800.—Hessert und Pilger Einige Worte uber die Kuhpocken und deren Impfung. Giesen, 1800. Treatises of Various Character, by Joerdens, Struve, Osiander, Friese, Domeier, Faust, Ecker, Schaeffer, Sachse, Schutz, &c.—An Account of some Experiments on the Origin of the Cow-Pox, by John G. Loy, M. D. Whitby, 1801. 8vo, pp. 29.—A Concise View

of all the most important Facts which have hitherto appeared concerning the Cow-Pox, by C. R. Aikin, Member of the Royal College of Surgeons, London. London, 1801. 12mo, pp. 202.—Ballhorn und Stromeyer, Deutschlands erste Versuche mit der Inoculation der Kuhpocken zu Hanover, Leipzig, 1801.—J. C. F. De Carro, Observations et Experiences sur l'Inoculation de la Vaccine. Vienna, 1801.—Careno Ueber die Kuhpocken. Wien, 1801.—Portenschlag Beytrag zur Geschichte der Kuhpocken in Oesterreich. Wien, 1801.—Himly und Rose Ueber das Impfen der Kuhpocken. Bremen, 1801. Soemmering und Lehr Prufung der Schutzblattern durch einimpfung mit Kinderblattern. Frankf. 1801.—A Treatise on the Cow-Pox, containing the History of Vaccine Inoculation, &c. by John Ring, M. R. C. S. L. Part i. London. 1801.—Practical Observations on the Inoculation of Cow-Pox. Pointing out a Test of a Constitutional affection in those Cases in which the Local Inflammation is slight, and in which no Fever is perceptible. Illustrated by Cases and Plates. By James Bryce, Member of the Royal Col. of Surg. Edinburgh, &c. &c. Edin. 1802. 8vo, 221.—A Treatise on the Cow-Pox; containing an Enumeration of the Principal Facts in the History of that Disease; the Method of Communicating the Infection by Inoculation; and the Means of Distinguishing between the Genuine and Spurious Cow-Pox. Illustrated by Plates, by George Bell, Surgeon, Edin. &c. Edin. 1802. Small 8vo, pp. 115.—Ferro Ueber den Nutzen der Kuhpocken-Einimpfung. Wien, 1802. Facts Decisive in favour of the Cow-Pox, by Robert John Thornton. London, 1802.—Practical Observations on the Inoculation of the Cow-Pox, by John Addington. Birmingham, 1802.—A Treatise by J. Ring, Part II. 1803.—Apology for differing in Opinion from the Authors of the Monthly and Critical Review, by John C. Lettsom. London, 1803.—J. J. Brehmer Von den Kuhpocken. Berlin, 1804.—Cases of Small-Pox subsequent to Vaccination, by William Goldson. 8vo. Portsea, 1804.—J. Ring's Answer to Dr Goldson, &c. London, 1804. Cow-Pox Inoculation no Security against Small-Pox Infection, by W. Rowley, M. D. London, 1805.—Observations on Vaccine Inoculation, tending to confute the Opinion of Rowley, by W. Frazer. Lond. 1805.—Treatise on the Lues Bovilla or Cow-Pox, by Benjamin Moseley. London, 1805.—J. Ring's Answer to Moseley. London, 1805.—Answers to all the Objections hitherto made against the Cow-Pox, by Joseph Adams, M. D. Lond. 1805. The Evidence at large as laid before the Committee of the House of Commons, respecting Dr Jenner's Discovery of Vaccine Inoculation. Lond. 1805.—Statement of Evidence respecting the Efficacy of Vaccination against Variola, by the Physicians of the Original Vaccine Pock Institution, established December 1799. 8vo. London, 1805.—On Vaccine Inoculation, by Robert Willan, M. D., F. R. S. &c. &c. London, 1806. 4to, pp. 108.—J. G. Bremser, Die Kuhpocken als Staatsangelegenheit betrachtet. Wien, 1806.—Report of the Royal Jennerian Society in Monthly Magazine. 1806.—E. E. Duvillard, Analyse et Tableaux de l'Influence de la Petite Verole sur la Mortalité et de celle, q'un Preservatif tel que la Vaccine peut avoir sur la Population et la Longevité. Paris, 1806.—Various Reports published by the College of Physicians, London. That of Dublin, &c. 1807.—Ueberlacher de Vaccinia Antivariolosa Epitome. Vindob. 1807.—Report of the Royal College of Physicians of London on Vaccination. Lond. 1807.—Schweikard, Beiträge zur Literature über die Kuhpocken und ihre Impfung vom Jahre 1795, bis 1807. Carlsruhe, 1809.—L. Sacco, Trattato di Vaccinazione con Osservazioni sul Giavardo e Vajuolo pecorino, Milano, 1809.—J. Thomson, Facts in Favour of the Cow-Pox. 8vo. Halifax, 1809.—The History and Practice of Vaccination, by James Moore, Director of the National Vaccine Establishment, &c. &c. London, 1817. 8vo, pp. 300.—Krauss, die Kuhpocken-Imp-

fung in ihrer endlichen Entscheidung als Angelenheit des Staates, der Familien und des Einzelnen. Nurnb. 1820.—*Traité de la Vaccine et des Eruptions Varioleuses ou Varioloformes*, &c. par M. L. B. Bousquet, Chevalier, &c. Paris, 1833.

IN the county of Gloucester, and others of the western English counties, it has been long known that, where there are extensive dairies, the cows have been, at certain periods, subject to an inflammatory disease of the udder, which is communicated by contact, so that, if a single cow was affected, the complaint soon spread among the herd. This disease appears on the skin of the udder or teat, in the form of several spots, or definite points, which are red, sore, and elevated, and afterwards become bluish-white, with the formation of a morbid fluid, which is at first thin and transparent, but afterwards becomes opaque and puriform, raising and detaching the scarf-skin as it is formed. These elevations have been termed pustules or boils, indifferently, or sores, till the precise nomenclature of Dr Willan referred them to the head of vesicles.

On the source of the Vaccine Disease or Vesicle, as it appears in the cow, different opinions have been entertained; but all of them may be referred to three heads.

It has been believed, in the *first* place, that it is a malady incident and peculiar to the cow, supervening in consequence of the operation of different causes; for instance, moist or marshy pastures, as was imagined by Osiander; the bites of insects in certain states; the acrimony of milk retained an undue length of time in the udder, and thereby irritating the lactiferous tubes and the teats; and certain states of the atmosphere in particular seasons.

It has been imagined, in the *second* place, that Cow-pox was merely the effect of the variolous poison evincing itself in the system of the cow. This appears to have been the opinion first adopted by Jenner himself, and also by Woodville and some others; and it appears to have been in this mode of thinking that he applied to the disease the epithet of *Variolæ Vaccinæ*, or Small-pox in the cow. This idea, however, Jenner himself soon abandoned, or at least appeared in his writings to substitute in its place another, to be presently noticed, and to think that the Vaccine Vesicle is different in origin and nature from the pustule (*phlyctidium*) of small-pox. The possibility of this origin was afterwards conceived to be refuted by

the experiments of Coleman and Sacco, who applied to the skins of cows and other domestic animals the variolous poison without inducing the proper variolous eruption. Viborg of Copenhagen, however, asserts that he communicated small-pox to dogs, apes, swine, and cows; and Gassner is stated subsequently to have produced, by the application of the variolous *virus* to cows, the genuine vaccine vesicle, which, on being communicated to the human body, again reproduced the cow-pox. —(*Salzburg, Med. Chir. Zeitung*, 1807, No. 67.)

In the meanwhile, it appears from the testimony of Dr Baron, that Jenner still believed in the identical origin of Small-pox in the human body, and the vaccine vesicle, as it appears in the udder of the cow; and Dr Baron, who espouses the same doctrine, has been at considerable pains to show, that among the epizootics recorded in history, an eruptive disease similar to small-pox has occasionally prevailed as an epizootic among the cattle of this and other European countries, and that this disease is the origin of the vaccine vesicle. One of the latest of these epizootics, described by Dr Layard in the *Philosophical Transactions* for 1780, bore so close a resemblance to small-pox in its symptoms, progress, and characteristic effects, that it was believed both by Dr Layard and Vicq-D'Azyr to depend on the operation of the same poison. Dr Baron even infers that the cow-pox, or *variola vaccinae*, as prevalent in Gloucestershire, Devon, Dorset, Somerset, Hampshire, Buckinghamshire, and other midland agricultural or pastoral counties, at the period at which Jenner announced their existence, were the endemic or local remains of the epizootic malady which prevailed so extensively at the period at which it was described by Dr Layard.*

Lastly, the views now stated seem to derive strong confirmation from some experiments performed by Dr Sonderland of Barmen. This author states, that if a woollen bed cover, or cloth, which has been several days on the bed of a small-pox patient, who has either died in the suppurative stage, or is under an intense form and degree of the disease, and is confined in a small imperfectly-ventilated apartment, and which has, consequently, been well-impregnated with the poisonous principle of small-pox, be applied firmly for twenty-four hours to the back of one or more queys successively, the animals in a few days become sick and feverish, and the skin, especially

* The Life of Edward Jenner, M. D. &c., by John Baron, M. D. Chap. v. and vii.

that of the udder, is occupied by an eruption of pustules, which assume the characteristic appearance of cow-pox, and are filled with lymph. He further adds, that the lymph so secreted, exactly resembles the lymph of the vaccine vesicle, and may be employed with certainty for communicating the vaccine or protecting vesicle. (*Variolæ Tutoriæ*.)—(Hufeland's Journal, Jan. 1831.)

It is almost superfluous to observe, nevertheless, that this experiment would require to be repeated, and that the statements of Dr Sonderland would need to be verified by other observers.

In the *third* place, the opinion which has the greatest number of partizans is that which ascribes the formation of the vaccine vesicle and its characteristic secretion to the inoculation by transference of the matter of grease from the heels of the horse to the udder and teats of the cow. It is well known that, from various causes, the fetlocks of the horse are liable to a species of suppurative inflammation, in which the parts, after much swelling, discharge thick bloody purulent matter profusely. This disease, which was known to the Greeks under the name of *κρίσσις* or *varices*, and appears to have been understood among the veterinary surgeons during the latter ages of the Eastern Empire, and is the *Javart* or *Eaux aux Jambes* of the French, the *Giardoni* or *Giavardo* of the Italians, the *Mauke* of the Germans, and the *Grease* of the English,—continues to prevail much during certain seasons in various agricultural districts in England.

As Cow-pox were observed to prevail principally when the horses of the same farm had suppurating or *greasy heels*; and as the same persons who dressed the heels of the horses were also, with too little regard to cleanliness, employed in milking the cows, it was concluded that the disease of the cow's teat, which was popularly termed *cow-pock*, was derived from the suppurating heels of the horse, the matter of which was believed to be a poison to the teat, and thus the material cause of a local inflammation and suppuration.

It was observed, that, from the heel of the horse and the teat of the cow, a disease similar to the cow-pock was often communicated to the hands of those who were engaged in the duties of attending to these animals; but that it was liable to peculiar modifications, or varieties of course and character, according

to the circumstances under which the disease was communicated. It was at length ascertained that this disease possessed definite and invariable characters only when it was derived from the teat of the cow, ere the morbid product of local inflammation had undergone a perfect change into purulent matter ; and various facts concurred to show, that transmission through the system of this animal was essential to the existence of the disease to which the name of Cow-pock was applied. For almost all the facts which we possess on the nature, progress, and properties of this disease in the human subject we are indebted to the diligence and ingenuity of one individual, who excited cow-pock artificially in sundry experiments in the persons of human beings.

This opinion on the origin of Cow-pox having received strong confirmation not only from the historical origin of the disease, but from the experiments of Fermor, Loy, Sacco, and many others, was adopted by Jenner himself. In this, however, there is some inconsistency, for the mode of reconciling which I refer to the work of Dr Baron. (Chap. vii. p. 242.)

On the 14th day of May 1796, Edward Jenner, then a physician in Berkeley, near Gloucester, first applied to the arm of a healthy boy of eight years, by means of two superficial incisions, the morbid fluid secreted by a sore on the hand of a dairy-maid who had contracted cow-pock from the udders of her master's cows. The seventh day after the operation he had uneasiness in the arm-pit ; on the ninth became chill, had head-ach, lost appetite, was otherwise indisposed, and spent a restless night ; but on the following day was free from complaint. Of the appearances of the local sore we have no particular information, but that it resembled a bluish pustule, was surrounded by an *erysipelatous* (red) circle ; and afterwards formed scabs and eschars without producing other inconvenience.

Further experiment was prevented, in consequence of the disease disappearing till the spring of 1798, when it again appeared in the dairies of Gloucestershire. On the 16th of March, a child of five years and a-half old was inoculated with matter taken from the teat of an infected cow. On the sixth day after the operation he was unwell, and vomited ; but on the eighth appeared to be in his usual health. The progress of the local vesicle was similar to that of the former case, except in the absence of the livid or bluish tint observed in the pustule. On the 28th of

March, the disease was transferred from the arm of this patient to that of William Pead, a boy of eight, with the usual appearances, and especially the red circle, quite similar to that which is observed after small-pox inoculation. To the redness in this case Dr Jenner first applied the term areola. From the fluid produced in this case, several patients, both young and adult, were infected; and in all the phenomena appear to have been uniform, or with deviations so trifling, that they do not require particular notice.

From the observations made in these cases, and from others ascertained by the industry of Dr Pearson of St George's Hospital, of Dr Woodville of the Small-Pox Hospital, of Dr Marshall of Eastington, of Dr Lettsom of London, of Mr Moore, and Mr Ring, but, above all, from the accurate observations made by Dr Willan,—the following facts have been established regarding the vaccine disease in the human subject.

Cow-pock, whether in the teat of the cow or in the skin of the human subject, consists in a local inflammation of the outer surface of the corion, which, by causing the secretion of a thin semitransparent fluid, elevates the cuticle so as to form a vesicle. At the same time, the redness, soreness, and hardness of the skin continue; and the inflammatory process denoted by these signs, causes suppuration of the corion with some destruction of its substance, or what is named ulceration.

If the thin fluid secreted by the vaccine vesicle, either in the teat of the cow or on the skin of the human subject, be taken before it has become opaque or puriform, and applied to the surface of the human corion exposed by scratching, very slight incision, or suitable abrasion of the cuticle, it is followed by local inflammation of the same characters as those of the original sore or vesicle from which the morbid fluid is taken. About the second or third day after insertion of the fluid the point of skin becomes red and slightly raised; this redness and elevation continue to increase till the cuticle is gradually elevated about the fifth or sixth day into a pearl-coloured spot or vesicle, which is found to derive its appearance from the secretion of thin transparent fluid, formed during the inflammatory process of the corion. The figure of this spot or vesicle varies according to the manner in which the vaccine fluid has been applied to the part. If it is by a longitudinal scratch, as is commonly done, the shape of the vesicle is oval; if it has been by

longitudinal and transverse ones of nearly equal size, or by simple punctures, then it is circular; and if the scratches have been numerous and irregular in direction, or if the fluid has been applied irregularly to them, the shape of the vesicle is also irregular. From its first appearance its upper surface is uneven, the margin being more elevated than the centre, and shining, firm, and distended so as to project slightly beyond the line of its base, or unaffected cuticle.

The appearance now specified it preserves till the end of the eighth day, when the surface is observed on the ninth to be even; and in some instances the centre may be higher than the margin. About the same time the skin round the vesicle becomes hard, red, and diffusely swelled, so as to form a vesicle or ring from one to two lines broad all round, and about from one-fourth to two inches in diameter. This circle of redness and hardness in the skin, which has been named the *areola*, marks an augment or increase of inflammation in the substance of the corion, which continues with pain and hardness of the contiguous parts, in some instances obvious swelling, till the end of the tenth or beginning of the eleventh day. At the same time the fluid of the vesicles becomes opaque and thick like purulent matter, rendering the centre of the vesicle yellowish, and depriving it of its pearly distended aspect. On the eleventh and twelfth days, as the marginal redness fades, the surface of the vesicle becomes brown in the centre, and less clear on the margin; the cuticle begins to separate; and the fluid of the vesicle gradually thickens into a hard round scab or crust of a reddish or yellow brown colour. This crust afterwards becomes black, dry, and shrivelled, and is loosened, and drops off about the twentieth day after the time when the vaccine fluid had been first applied.

When the vesicle is fully formed about the eighth day, it is found to consist of many minute cells, which communicate with each other, and in which the fluid, which is generated by the inflammatory process, is contained. This cellular disposition is a characteristic of the vaccine vesicle; for it is found to occur under every variety of circumstances, when the origin of the vesicle is genuine, and its progress uninterrupted; and when the scab drops off, the scar, which is permanent and uniform, is distinguished by minute pits or depressions corresponding to the number of cells of which the vesicle consisted.

During the progress of the local inflammation some disorder

of the constitution takes place. This, when it does occur, appears about the seventh or eighth day in the form of loss of appetite or sickness, slight thirst, and heat and dryness of the skin. The pulse is almost never affected. The vaccine vesicle may also produce sundry cutaneous inflammations, very transitory, and of a secondary nature. Of these the vaccine Rose-rash (*Roseola vaccina*,) and a hard phlegmonous inflammation of the skin, are most important and common.

It must not, however, be understood that vaccine fluid, when applied to the human body, ever produces a general eruptive disease like itself over the person. This was, indeed, believed to be the case at first by Jenner, Pearson, Woodville, and perhaps some others. But observation and more correct knowledge of the natural history of the disease have shown that its action is strictly confined to the identical spots to which it is applied; that these and these only become the seat of the genuine vaccine inflammation; and that, whatever eruptions or other morbid changes on the skin succeed, or have been said to succeed the communication of cow-pock to the human body, are not the result of its genuine and proper action. It is strictly and truly a local morbid process.

That the genuine vaccine disease be properly excited, and observe its legitimate progress, it is requisite to attend to the circumstances under which it is communicated. The fluid by which it is to be transmitted must be taken neither too early nor too late. It must be taken not before the fluid is secreted in its proper transparent state, and not after it has become opaque or puriform. In the first instance no inflammation or vesicle will succeed; in the second, a disease will be produced much the same as from the application of purulent matter of any kind to the surface of the corion. If it is taken about the seventh or eighth day, not later, when the vesicle retains its pearly appearance, and before the secondary inflammation has commenced, it will produce the genuine vaccine disease in persons not affected by eruptive or other febrile disorders, and not labouring under other cutaneous inflammations.

The fluid also must be actually applied to the exposed corion. The disease is not communicable by contagious effluvia, as was believed by Dr Woodville, but absolute contact only. (Jenner, *A Continuation of Facts*, &c., Bryce, Section iii.)

The febrile diseases which interfere with the vaccine inflammation, and may suspend or counteract it are, conta-

gious Fever (*Typhus, Synochus,*) epidemic Catarrh, or Influenza, Measles, Scarlet Fever, Throat Scarlet Fever, and Chicken Pox; and analogy would lead to the conclusion, that all similar disorders, as Ague, Remittent Fever, Plague, &c. would be attended with similar consequences. The mere cutaneous diseases which interfere with the vaccine action are, Shingles and vesicular Ring-worm (*Herpes,*) the dry and moist Tetter (*Psoriasis, Impetigo,*) Lichen, or Sun-rash, the Scall-head (*Porrigio,*) to which may, perhaps, be added Itching-rash (*Prurigo,*) and common Itch (*Scabies.*)

The history above given of the progress and characters of the Vaccine vesicle shows clearly, in my opinion, that the application of the vaccine fluid in the conditions now specified is succeeded by a local inflammation of the corion, which observes a certain definite progress, divisible into two stages. In the first of these stages, which I term the *primary* or *immediate*, the inflammatory process is confined with great accuracy to the cuticular surface of the corion. This process diffuses itself very uniformly from the point of insertion, at equal distances, in every direction, and terminates in effusion of lymph, and elevation of the cuticle. During this first stage, which lasts about seven or eight days, the minute cells are formed. They appear to consist in separate points of inflammation, in which the corial vessels discharge lymph in a fluid or semifluid state, as in other examples of the inflammatory process, and which lymph is speedily coagulated in a definite form. The coagulated portions form the partitions of the cells, while the fluid part is thus contained in them. The appearance of the red ring (*areola,*) which takes place about the eighth day, indicates the commencement of the *secondary inflammation*. This consists in the action being propagated to the substance of the corion, which is affected to some extent, in the formation of purulent or puriform matter, and in destruction of a part of its tissue. As this inflammation of the substance of the corion proceeds, it is attended with redness, hardness, and painful swelling of the surrounding skin, and sometimes of the cellular membrane; and these symptoms only disappear when this process has terminated in the suppurative destruction of the part to which the poison was applied.

It was one of the remarkable properties of the vaccine inflammation first announced and applied by Dr Jenner, that a person in whom the process has taken place in a proper and

satisfactory manner, is not liable to be affected by small-pox. This inference was at first controverted and doubted, and afterwards believed to be confirmed. The researches of many inquirers, and particularly of Dr Thomson of Edinburgh, have shown that it must be modified in the following manner.

The human body is liable to be attacked with small-pox more than once in the duration of life. Every previous attack modifies that which follows; and a person who has once undergone the disease, though he may be subsequently affected with it, undergoes it in a different form. In the same manner an individual who has suffered cow-pox may be attacked with small-pox, exactly as one who has suffered small-pox may be again attacked with that disease. A person, however, who has suffered cow-pox is not only much less likely than another to be affected with small-pox even when epidemic, but will certainly have them in a much milder form, and in a form which is almost impossible to prove fatal. He may have the disease in what is termed the *modified form*, or in that named chicken-pox; and according to the experience of the epidemic of (1816–1820,) one death takes place in 330 thus affected; and it is probable that more extensive experience would show this proportion of mortality to be much greater than it really is. This subject will be resumed under the head of Small-pox.

These advantages, which originally induced Dr Jenner to apply this disease for the purpose of counteracting the poison of small-pox, and rendering the human body secure against its attacks, are sufficient to recommend the vaccine disease as the most powerful antivariolous agent within the knowledge of man. It is well known that it has been employed since the year 1798, and especially since the commencement of the present century, for this purpose, not only in the British dominions, where its powers were originally ascertained and demonstrated, but in all the nations of Europe, in the United States of America, in our colonies in the East and West Indies, coasts of Africa and New South Wales; and that its adoption is practised wherever the influence of civilization can be conveyed.

To the artificial production of the disease, the term *Vaccine Inoculation* was first applied in contradistinction to that of *Small-pox Inoculation*, which was then practised generally. It is now more convenient to distinguish it by the name *Vaccination*, leaving that of *Inoculation* to its original use.

The best mode of practising vaccination is sufficiently well ascertained. Besides the condition already noticed of attending to the qualities of the lymph, it is requisite merely to detach the cuticle and expose the corion by a sharp instrument. Incision must be avoided, as bleeding is likely to prevent the continuance of the proper lymph, or at all events to dilute it, and prevent it from acting on the exposed skin. When the fluid dries, it may be left uncovered, or covered loosely with a slight portion of linen cloth. The subsequent management will be easily understood from the details already given of the progress of the disease.

Mr Bryce, of Edinburgh, proposed in 1802, a second insertion of vaccine matter, at the interval of five or six days after the first, with the view of giving greater certainty to the perfection of the process. When matter is applied to the corion under these circumstances, it is found to form a vesicular inflammation in a shorter time than the first; but the local action appears to be less violent, less extensive, and more rapid in its progress. Mr Bryce showed by experimental vaccination, "that, if during the regular progress of cow-pox, a second inoculation be performed a certain number of days after the first, the affection produced by this second inoculation will be accelerated in its progress, so as to arrive at maturity and again fade at nearly the same time as the affection arising from the first inoculation; and that this will take place although the constitutional affection be so slight as otherwise to pass unnoticed." On the question of the most proper time for this second insertion of vaccine matter, Mr Bryce inferred from many cases in which the second inoculation was performed at different periods of the primary affection, "that the most proper time for performing the second inoculation is about the end of the fifth or beginning of the sixth day from the first inoculation. If the second inoculation be delayed beyond the sixth day, the affection produced by it will be very indistinct, and of short duration; and if performed at an earlier period than the fifth day, the contrast between the progress of the two affections, with regard to duration, will not be so great as may be thought necessary." In short, in order to obtain the proposed criterion in the greatest perfection, the second inoculation should be performed between thirty-six and forty-eight hours before the *areola* of the first inoculation begins to appear.

This is necessary, in order that the secondary affection may have proceeded some length, and that a small vesicle containing virus may have been formed by it, before the constitutional action from the first inoculation begins; otherwise no *areola*, but merely a slight degree of hardness, will take place from the second puncture. (Practical Observations, p. 189, 2d edit. 1809.)

That this mode may be used with great confidence as a proof of the influence of the vaccine disease on the individual, has been since established by the result of many observations. As an example, I shall state those of Mr Hugo of Creditun, published in the 13th volume of the Medical and Physical Journal for January 1805. About the sixth day, when the vesicle or the inoculated part is formed, or about three days before the *areola* may be expected to come on, he inserts the point of a lancet into the vesicle, and with the lymph which exudes he inoculates the other arm. The progress of the second inoculation is very dissimilar to that of the first. The vesicle proceeds more rapidly through its stages, exhibiting an *areola* at the same time as the vesicle on the other arm, and being on the ninth or tenth day in an equal degree of forwardness, but more diminutive. This Mr Hugo considers as so decisive a test of constitutional affection, especially in children, that unless it takes place, he never ventures to warrant any patient's security against variolous infection, but advises that the inoculation should be repeated at a subsequent period.

“ This test, however,” Dr Willan remarks, “ will fail, if the fluid employed be taken from the inoculated person's own arm, when the primary vesicle is one of the irregular kind, which produces disorder of the constitution, but affords only an imperfect security against the small-pox.”

Before concluding the subject of cow-pock and vaccination, it is necessary to notice the views to which the recent observations on cow-pox modifying small-pox, and small-pox modifying itself, have led. The general conclusion from these observations is, that the change effected on the human body by vaccination is not quite so absolute as it was originally represented to be. That it does effect a change of some kind, certainly very considerable, must be inferred, not only from the phenomena of those forms of small-pox which occur in the persons of the vaccinated, but also in a more conspicuous manner from the phenomena of this process performed on Mr Bryce's

plan a second time on the same individual. The vesicle produced in this manner, or even any vesicle subsequent to the first vaccination, is evidently a modified cow-pock, or what Dr Sacco termed a *vaccinetta*, and Dr Thomson *vaccinella*, and bears the same relation to the first cow-pock, that modified small-pox or chicken-pox bear to the first attack of small-pox.

Small-pox. *Variola. Variolæ. La Petite Verole*, French. *Il Va-
iuolo*, Ital. *Die Pocken, Die Blattern*, Germ. *Ospa*, Polon.

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Hahn *Variolarum Antiquitates nunc primum e Graecis erutæ*. Brigæ, 1733—Freind *Historia 1734.*—Werlhof *Disquisitio Med. et Philolog. de Variolis et Anthracibus Hanov. 1735.*—Mead *De Variolis et Morbillis Liber*. London, 1747.—Trilleri *Opusc. Med. Vol. ii. Francof, 1766.*—Epist. duæ de Anthracibus et Variolis Veterum.—Gruneri *Morborum Antiquitates*, Vratislav. 1774—Sprengel *Pragmatische Geschichte*, Tom. ii. *Schaufass Neueste Entdeckungen über das Vaterland und die Verbreitung der Pocken und der Lustseuche*. Leipz. 1805.—*Miscellaneous Works of the late Robert Willan, M. D., &c. comprising an Inquiry into the Antiquity of the Small-Pox, Measles, and Scarlet Fever*, now first published and edited by Ashby Smith, M. D. London, 1821. 8vo.

A disease having the character of small-pox is believed to have been known in China about 1722 years before the birth of Jesus Christ, and to have passed thence to the contiguous territories of Japan and India.

It has been the subject of keen controversy, whether small-pox was known to the Greek and Roman physicians. Hahn, Triller, Scuderi, and more recently Willan, have with much learning attempted to prove that the disease was known to the ancients; and, on the other hand, Freind, Werlhof, Mead, Van Swieten,

Gruner, and Sprengel have regarded the evidence as inconclusive.

The first appearance of the disease in Arabia is generally referred to the 558th or the 572d year of the Christian era; and the first distinct account of the disease was given about the end of the ninth century by Alrasi (Rhazes,) who acknowledges that he followed Ahrun and some of the ancient Arabian physicians. From Arabia and the interior of Egypt, it appears to have been imported into Spain, about the close of the eleventh century, and thence to have spread over Europe. (Freind et Borsieri.)

Small-pox may be defined as a disease beginning with fever, sickness, and more or less affection of the mucous membranes, and terminating in an eruption on the skin of pimples, which speedily pass into vesicles or pustules (*phlyctidia*,) or both, sometimes with ulceration, sometimes with gangrenous points.

Small-pox has been distinguished according to the characters of the eruption into distinct, (*Variola discreta*,) coherent, (*Variola coherens*,) (*Variolæ corymbosæ*,) and confluent, (*Variola confluens*;) according to the course of the disease into regular, (*Variola regularis*,) and anomalous (*Variolæ anomalæ*;) and according to the prominent symptoms and the respective affection of particular textures, into inflammatory (*Variola Inflammatoria vel Phlogistica*;) gastric small-pox (*Variola gastrica*,) and typhoid or nervous small-pox (*Variola Typhodes*, *V. Nervosa*.)

Small-pox is said to be *distinct* when the vesicles or pustules are of good average size, and when they are separated from each other by intervals of unaffected skin, or at least do not coalesce or run into each other. They are said to be coherent or clustered (*Variolæ corymbosæ*,) when two or more cohere in clusters, but not so much as to prevent each from being distinguished, and the whole from being counted. They are said to be confluent (*Variola confluens*,) when several vesicles or pustules are united into masses of blistered skin, in which there are no intermediate spaces, and in which the separate pustules can no longer be distinguished.

In the distinct small-pox, which is also generally regular in course, it is convenient to distinguish the course into four stages, 1st, the febrile stage (*stadium febrile*,) extending from the first day to the fourth; 2d, the eruptive stage (*stadium eruptionis*,) from the fourth day to the seventh; 3d, the ripening stage

(*stadium florescentiae, maturationis, vel suppurationis,*) from the seventh day to the eleventh; and 4th, the stage of desiccation or decision, (*stadium exsiccationis sive desquamationis,*) from the eleventh to the fourteenth or fifteenth day.

I. Small-pox when simple, regular, and distinct, commences, like other febrile disorders, with a sense of cold, sometimes distinct shivering, feebleness, drowsiness, heavy pain of the head, anxious, panting breathing, and sickness or even vomiting. Infants and children are generally restless and fretful, or are attacked with slight stupor, grinding of the teeth, and even convulsions. Adults complain much of bruising pain in the head, neck, back, loins, and limbs generally, and pain or tenderness in the pit of the stomach, which is always uneasy when pressed, and sometimes tense and distended.

After more or fewer of these symptoms have continued for from twelve to twenty hours, the marks of a hot stage are observed to ensue. The skin is hot though not dry; the patient is thirsty, the face is flushed and somewhat swelled, the eyes are red, injected and watery, the nostrils are stuffed, and there is occasional sneezing; the motions of the heart and pulse are more frequent in a given time than natural, (96-108 and 108-120;) and at the same time become strong and full; respiration is rapid, 30-36 or 40, panting and laborious, with occasional cough, and more or less hoarseness; and the night is spent without sleep, and sometimes with confused dreaming and delirium. In the morning there is generally some moisture of the skin; and if the patient be kept in bed, this continues more or less for the ensuing two days, yet without diminishing the quickness of the pulse, or the labour of respiration. At this time, that is in course of the second day, the breath and cutaneous discharge are generally remarked to exhale a peculiar odour, something musty, yet not easily described. The sweating is mostly observed in adults. The urine is at the same time scanty, and of a deep red colour, and is sometimes turbid, and deposits a branny sediment.

The train of symptoms now described occupies the first, second, and third days; and on the evening of the latter, or the morning of the fourth day, while the skin is felt to be tense and itchy, minute red spots, sometimes patches, are observed on the face, on the forehead, about the upper lip, the sides of the nose and the chin, and then on the neck, breast, and upper

extremities, next on the belly and back, and latterly on the lower extremities. These red spots may be first in the form of minute pimples, slightly hard, and elevated, and gradually enlarge in size both at their bases and upwards, until they are converted successively into vesicles and pustules (*phlyctidia*.) When they first appear, the symptoms undergo slight but perceptible alleviation. The sickness and pain at the pit of the stomach are abated or disappear entirely. The respiration is less anxious, and becomes slower and less laborious, with abatement of the sneezing and cough. The pulse also is less frequent by about 10 or 12 beats. The mind of the patient is clear and collected, and he makes less complaint of the bruising sensation in the back and limbs. The hoarseness, however, may continue, and it is not uncommon for the patient to have sore throat, pain, and difficulty in swallowing, and some salivation during the first two days of the eruption. In general, in cases of this kind, there is either an eruption of vesicles or pustules about the base of the tongue and throat, or there is much general redness, swelling, and soreness of the mucous membrane of the throat, and even the *larynx*. As the eruption proceeds, however, the proper febrile symptoms continue to decline, and on the fifth or at most on the sixth day, when the eruption is completed, cease entirely, the pulse being natural in strength and frequency.

From the fourth day of the disease, on which the eruption appears, first in the form of red, hard and slightly raised pimples (*papulae*,) giving the skin a rough knotty aspect and feeling, the pimples enlarge at their margins, with slight redness, of a damask colour in the neighbouring skin, while their summits (*apices*,) consisting of cuticle elevated by whitish semitransparent serous fluid, increase in size and area till the seventh day, when the eruption is completed. In this enlargement the individual *phlyctidia* follow the same course as in their first appearance, those on the face and neck attaining their proper size first, and those of the upper extremities, the trunk and lower extremities in succession.

In this course various changes in the pustules take place. They enlarge chiefly by the margins, which are marked by a red ring or hoop of some breadth (*halo ruber*, *areola*); their contents become opaque and whitish-yellow or straw-coloured; the summits (*apices*) are flat and level, or even may present a

minute pit or hollow (*foveola*). These changes may be observed on the sixth day in the pustules of the face and neck; but in general they occur in those of the extremities only on the eighth day. It is on this account that Joseph Frank and Francis Hildenbrand distinguish the suppurative stage, or that of maturation, as commencing on the eighth day, though, indeed, with the pustules of the face and neck it commences on the fifth or sixth.

On the eighth day, however, the pustules begin to lose the marginal red ring and the depression of the summits, and are filled with opaque, white or yellow fluid, which gives them a hemispherical shape, and in general causes the exhalation of a peculiar odour.

This process is attended, when the pustules are numerous, with considerable general disorder and local irritation. The pulse becomes a little quicker, sometimes very much so, with a distinct fit of shivering, and an increase of heat and thirst. The face is generally diffusely swelled, with more or less heat and itching, and the eyelids are so swelled that the eyes are closed for a day or two.

On the tenth day, or at farthest on the eleventh, when the swelling of the face abates, and the features begin to reappear, the pustules are fully distended with yellow opaque matter, and on the summits appears a dark spot, at which the cuticle gives way, and the contents partly escape and are partly dried into a crust, while each pustule is shrivelled and thus converted into a scab. On the legs and feet many of the pimples and vesicles do not pass into the pustular form; but, the cuticle over them shrinking, they are shrivelled, and form imperfect scaly crusts. This has been almost invariably ascribed to absorption of matter. But the truth is, that matter is not formed, as the serous fluid produced by the first inflammation does not proceed to the suppurative stage, and as it is condensed in the serous form, the cuticle shrinks over it, and thus forms the scaly dry crusts seen on that part of the body. In the meantime, the fever and swelling of the surface, if induced, subside, and the crusts, excepting the largest and thickest, drop off about the seventeenth day, leaving the surface of the new skin of a reddish brown colour, and occasionally, if these have been ulcerated, slight depressions. In the former case the discoloured patch-

es are named blains (*maculae*). In the latter they are pits (*foveolæ*.)

The description now given is applicable to small-pox when distinct, regular, and rather mild. When the pustules are coherent or confluent, the disease is greatly more severe, and presents several anomalies in symptoms and in progress.

In the coherent form, in which several *phlyctidia* coalesce or rather cohere to each other, the pustules do not undergo so perfect or easy suppuration as in the distinct disease, and they give rise to more swelling and pain, with more intense fever, and are liable to produce pits and eschars. In many cases, however, the pustules are coherent on the face and neck, and distinct on the trunk and extremities. Salivation is less common than in the confluent form.

The pustules in distinct and coherent small-pox have further been observed to present several peculiar modifications. Thus the vesicles are sometimes filled with a thin transparent serous fluid, supposed to be acrid and even corrosive, and which is not readily convertible into purulent matter. They are then denominated Crystallines, (*Variolæ crystallinæ*, Mead, vel *Lymphaticæ*.)* A particular form of this, consisting of round soft concave bladder-like vesicles, flaccid and void of fluid, was named by Freind the bladder-pox (*Variolæ siliquosæ*.)† A third variety of eruption sometimes observed in distinct small-pox, but in general attended with the train of unfavourable symptoms to be mentioned under the head of symptoms of Nervous complication, is that in which the pustules are small, hard, and void of fluid, like warts, named the stone-pox or horn-pox (*Variolæ Verrucosæ* (Stein-Pocken.) These are slow in undergoing suppuration; and the concomitant fever, when induced, is generally severe and attended with symptoms of nervous disorder. These three varieties, though seen in distinct small-pox, are common in the confluent.

In the confluent small-pox, three circumstances deserve attention. 1. The symptoms of the eruptive fever are more violent, and indicate more or less affection of some of the internal organs. 2. The eruption appears, in general, early on the third day, and consists of numerous pimples mutually crowded and coalescing, which continue small and empty, and rarely un-

* Mead. De Variolis, cap. ii. p. 21.

† J. Freind de quibusdam Variolæ generibus, Epist. ii. 1723.

dergo benign or complete suppuration, and if they do proceed to suppuration, the process is attended with very great febrile disorder. 3. On the appearance of the eruption the fever does not cease, but undergoes only a slight remission ; and after the fifth or sixth day all its symptoms proceed with increased intensity during the whole course of the disease. These peculiarities will require separate notice.

1. The violence of the eruptive fever in confluent small-pox is indicated by the panting, labour, and extreme anxiety of the respiration, the presence of short frequent dry cough, with frequent, small, contracted or oppressed pulse ; the presence of violent delirium or coma or a typho-maniacal state, convulsions in adults, or epileptic fits in infants ; difficult deglutition and salivation, more or less profuse, intense pain at the epigastric region, with much vomiting ; faintness, diarrhœa, or hemorrhages either from the lungs or the intestinal tube, or the womb in females. It occasionally happens that one or more of these symptoms may be so intense as to give the disease a peculiar character ; and hence Stoll distinguishes one variety of small-pox as *Gastrico-bilious*. Borsieri distinguishes the symptoms as inflammatory, nervous, and putrid, and Frank and Hildenbrand divide the anomalous forms of the disease into *inflammatory*, *gastric* and *nervous*.

With regard to the gastric or gastrico-bilious small-pox, the following observations may be offered.

It may be observed, in the *first* place, that every variety of small-pox is preceded or accompanied with more or less tenderness and pain of the epigastric region, and more or less sickness and vomiting, and certainly this symptom is more violent and enduring in confluent than in distinct small-pox, but in none is it altogether wanting. When it seems to be absent, it is merely obscured by the intensity of the affection of the brain and the lungs. The symptoms of gastric disorder ought, perhaps to be regarded as occurring rather at a particular stage of the disease, than as forming a peculiar complication. They are always relieved upon the appearance of the eruption.

Every variety of small-pox also is accompanied with more or less difficulty of deglutition, salivation, and sore throat, depending, as already stated, on general redness and swelling of the mucous membrane of the throat, with some affection of the tonsils and base of the tongue (*glossitis*,) with or without the presence of pustules or vesicles in the mucous membrane of the *fauces*.

Upon this swelling evidently depends the discharge of *saliva*, which is partly increased in secretion during the inflamed state of the salivary glands, and which is partly prevented from being swallowed, as in severe cases of *angina tonsillaris* by the size of the tonsils, and the inability of the *velum* and tongue in moving. This inflammation of the guttural mucous membrane is always much more intense in the confluent and severe forms of small-pox than in the distinct and mild varieties, and may be so violent as not only to aggravate much the sufferings of the patient, but even to threaten life by inducing suffocation. The salivation commences at the same time as the eruption, sometimes a day or two later, and the saliva is not only augmented in quantity, but it is changed in quality, by being mixed about the eleventh day with much viscid tough mucus from the inflamed membrane; and at the same time the throat is so much affected, that the voice is nasal, and liquor drank is forcibly rejected by the nostrils. After the eleventh day the salivation sometimes stops, and occasionally it recurs for a day or two; and when it stops thus suddenly, death by suffocation very generally ensues.

It is also to be observed, that diarrhœa is an occurrence not uncommon in small-pox, and has been observed in many epidemics, as not only not detrimental, but as a favourable symptom. Thus Sydenham admits that it was a symptom as certain in the confluent small-pox in children as salivation in adults,* and so favourable that it ought not to be checked. The same view was taken by Hoffman. In a small-pox epidemic at Turin in 1720, observed by Richa,† the disease commenced with diarrhœa, which continued throughout with favourable issue. Similar facts have been noticed by Vogel, Borsieri, and others.

From these facts, and the difficult deglutition and profuse salivation, it may be inferred, that there is in small-pox considerable irritation of the mucous membrane of the alimentary canal, that this irritation may subside upon the establishment of the eruption, but that it may nevertheless persist during the whole course of the disease, and proceed in some parts to inflammation. This irritation of the gastro-enteric mucous membrane, however, presents this peculiarity, that its severity does not in general add to the severity of the disease itself, and that,

* Thomae Sydenham Opera Universa, Lond. 1705, sectio iii. caput i. p. 100.

† Caroli Richa Constitutio Epidemica Taurin, an 1720, § xv.

caeteris paribus, its presence tends to moderate the violence of the symptomatic fever, and the intensity of the cutaneous inflammation.

It is very different with the other two varieties of complication; the inflammatory and nervous or typhoid.

The inflammatory complications of small-pox are indicated by the intensity of the febrile symptoms, with the presence of symptoms indicating inflammation of some part of the mucous membranes, or of an internal organ.

The part most usually affected with inflammation in small-pox is the mucous membrane of the throat, windpipe, and bronchial tubes or lungs. This affection takes place in a slight degree in the distinct small-pox, but always more severely in the confluent form of the disease. It may appear either in the form of laryngeal inflammation, or inflammation of the tracheo-bronchial mucous membrane, or *bronchitis* or peripneumony. In the first case, it consists in inflammation of the mucous membrane of the larynx and glottis, sometimes though not always with an eruption of imperfect aphthous pustules, on the membrane of the *glottis*. The voice is then hoarse, stridulous, or gone, and the respiration is stridulous and clanging, with much motion of the larynx, and anxiety, and hoarse ringing cough. To these may be added frequent difficult, panting, breathing (*dyspnœa*,) with the indications of *bronchitis*, or peripneumony. In such cases, the mucous membrane of the windpipe and bronchial tubes is much reddened, and not unfrequently covered with a new secretion.

Reil, who observed at Halle in 1791 a bad variolous epidemic, with symptoms of tracheo-bronchial inflammation, states, that one of the most common formidable symptoms of the disorder of the respiration was the inversion or great retraction of the sternum. At each inspiration, he says, the sternum, especially its lower end, was, with the cartilages of the ribs, drawn so much inwards that it appeared to touch the dorsal *vertebræ*, and formed a depression in which the fist could be placed. At the same time the respiration was sibilous and very laborious. This symptom, which occurred chiefly in children under six years, was, when well marked, always fatal.*

In this variety of complication death may take place in different modes and at different periods of the disease. In the

* J. C. Reil, *Memorabil. Clin.* Halae, 1792. Vol. ii. iii. p. 56.

first place, it may take place on the third or fourth day of the disease, amidst great oppression of the respiratory organs, and when the eruption is scarcely established on the skin, or at least is in the form of innumerable minute rudimental vesicles. In this case the tracheo-bronchial membrane is red and vascular, and covered by a thin but general mucous coating, while the minute tubes and vesicles are filled with frothy serum. *Secondly*, if the patient survive this, life may be protracted for several days longer till the secondary fever commence; and at the same time the tumefaction of the face, throat, and the nasal mucous membrane, with difficult deglutition and salivation, cause much distress, and may induce fatal suffocation, as already stated, on the eleventh day of the disease. There are, at the same time, symptoms of bronchial inflammation, which, though not alone adequate to induce death, contribute with the affection of the throat to the fatal event. *Thirdly*, if the affection of the nasal and guttural mucous membrane be moderate, and if the salivation be not suddenly interrupted, life may be continued beyond the eleventh day. The bronchial disorder, however, too frequently at this period becomes very intense, and terminates in effusion into the pulmonic vesicles, producing death on the fourteenth day.

In other instances the inflammatory symptoms denote the existence of *encephalitis* or *meningitis*, or both.

A more frequent result, however, when the brain and its membranes are affected, is a progressive vascular congestion, causing *vertigo*, *delirium*, *typhomania*, and *subsultus*, tending to effusion, and causing death by convulsion and coma. This is the variety denominated nervous and typhoid by Borsieri and Joseph Frank. These symptoms may appear early in the disease; and indeed every variety of small-pox is introduced with more or less headach, giddiness, somnolence, and lethargy, and sometimes convulsions. These symptoms may disappear on the establishment of the eruption, and not return. Under two orders of circumstances, however, they are apt to be aggravated or to recur in a formidable shape, and contribute to the fatal result. The first is when the eruption is very confluent but imperfect, small, and watery, when the symptoms of somnolence, instead of being relieved, are aggravated into coma, terminating fatally, sometimes on the sixth, or, at most, on the eighth day. The pustules are then not only small and wa-

tery, but show no disposition to assume the inflammatory stage, being void of the red areola, with which they are in the favourable form attended. The second case is when the head-ach, giddiness, and somnolence are relieved or subside upon the appearance of the eruption, but recur during the inflammation and disorder of the secondary or suppurative fever, with the swelling of the face and head. These symptoms may proceed to coma, terminating fatally on the tenth or eleventh day. In a third case, the symptoms of bronchial and peripneumonic inflammation, by interrupting the return of the blood from the cerebral vessels, give rise to a slow but progressively increasing congestion, which may concur with the affection of the lungs in producing the fatal issue.

A septic, putrid or gangrenous form of the disease has been also mentioned as extremely malignant and fatal. Since this, however, constitutes not so much a complication as a peculiar form of the eruption, perhaps it is best to refer it to the subsequent head.

It sometimes happens, that, besides the complications now mentioned, the kidneys present symptoms of disordered action in the circumstance of bloody urine, or urine more or less tinged with blood (*hæmaturia*.) The symptom is unfavourable, and indicates impeded circulation in the vessels of the kidneys. In other instances the secretion may be entirely suppressed.

2. In the confluent and anomalous small-pox, the eruption generally appears early on the third day, instead of the fourth, in some instances on the second, and in other instances, in which the somnolence and stupor, or languor, squeamishness, weakness, &c. are serious and long continued, the eruption has been known to be delayed or retarded till the fifth or sixth day, or even, according to Huxham, for seven or eight days, and then end in a crop of pale, imperfect flaccid pimples, or broad watery blisters, (p. 127.)

The pustules themselves are liable to present different varieties in appearance. Besides the three varieties already noticed, of crystallines (*V. Crystallinæ vel lymphaticæ*), bladder-pox (*V. siliquosæ*), (*Variolæ bullatæ*, Sagar,) and stone-pox or horn-pox (*Variolæ verrucosæ*; *v. corneæ*),—practical observers have distinguished the serous or ichorous (*Variolæ ichorosæ*), the emphysematous (*Variolæ emphysematosæ*), the bloody (*Variolæ sanguineæ*), the erysipelatous, the measly (*Variolæ morbillosæ*), and

the gangrenous or septic (*Variolæ septicæ*.) The serous or ichorous are evidently a variety of the crystalline or lymphatic; and the emphysematous are the same as the bladder-pox, or si-liquose eruption of Freind.

A variety of small-pox, described by Sydenham as the black small-pox, and by Morton as the most fatal species of confluent small-pox, in which the eruptions appeared on the second or third day in the form of a general redness, like erysipelas, of the face, without any intervals of uncoloured skin, has been denominated erysipelatous by Borsieri. The rest of the body is covered with an infinite number of red pustules, or hard tubercles, coalescing and confluent; and in the intermediate spaces, especially on the thighs, are blebs or bladders containing serous fluid, with the subjacent skin dark-coloured and dying. No remission takes place in the fever, which is accompanied with delirium, sleeplessness, hemorrhages, and other formidable symptoms; and a leaden colour and parchment aspect of the skin (Morton, cap. viii.) precede the fatal termination of the disease, which in the cases with the vesications took place on the seventh day, in many others on the fourteenth day, and in some on the seventeenth day. If the patient survived the latter period, he had a chance of escape. Of this the morbillous or measly is evidently only a variety, in so far as Morton allows, that, during the first day of the disease, it is difficult, unless by the resisting hardness, to distinguish the eruption from that of measles.*

The small-pox are said to be bloody (*Variolæ sanguinæ*, De Haen; *Var. hæmatosæ*.) and gangrenous or septic, when they appear either in the form last mentioned, and assume a dark-coloured tint, or consist of vesicles filled with blood or bloody serum, and are interspersed with black or purple spots (*petechiæ*.) and stripes (*vibices*.) This is a very fatal form of the disease, not more than one in three, according to Huxham, recovering.

3. The third mark of distinction proper to confluent small-

* "Eam autem non esse Morbillosam probat inaequalis cutis *Asperitas* et *Durities* quadantenus renitens tuberculorum, quæ licet ex incerta et varia figura, quam primo eruptionis die obtinent, morbillos mentire videantur; revera autem malignam suam indolem atque vacillantem spirituum debilitatorum œconomiam inde solummodo ostendunt, quam postremis hujus stadii diebus clarius probant, ubi minime ne quidem acuminata, verum prorsus sessilia, livida, atque quasi mortua ubique apparent."—Morton, cap. viii.

pox is the absence of alleviation in the febrile symptoms, on the appearance of the eruption, and the persistence of the symptoms in a more intense and unmanageable form. In distinct small-pox there is sometimes on the eighth day a slight increase of heat and some rise of the pulse, which can generally be traced to the suppurative stage of the pustules, upon the completion of which the skin becomes cool and moist, the tongue clean, and the pulse natural. In the varieties of confluent small-pox, however, all that can be recognized is sometimes a slight remission on the seventh day, providing the pustules come out freely. More commonly, however, no remission at all is observed. The pulse continues quick, but small, feeble, and oppressed; the skin hot, with occasional coldness of the extremities; the thirst is intense; the patient is delirious, or mutters without sleep; the respiration is quick and laborious, with hoarseness or complete *aphonia*, and frequent hard ringing cough (*tussis ferina*;) and the urine is retained or discharged mixed with blood; and, the delirium or typhomania passing gradually to coma, with *subsultus tendinum*, death takes place, partly by suspension of the influence of the brain and spinal marrow, partly by asphyxia from *laryngitis*, with *œdema glottidis*, or from peripneumony.

This fever, which is generally denominated secondary, has been understood by some to depend upon the suppuration of the pustules. This, however, it does in a very small degree only; for in many cases in which the pustules undergo no suppuration, the febrile symptoms are violent and aggravated. The intensity of its symptoms is, in cases of this kind, associated with and proportionate to the inflammation of the mucous surfaces of the nose, throat, windpipe, and bronchial tubes, and to the irritation and disorder thereby caused to the functions of respiration and circulation.

Lastly, in some instances symptoms exactly similar to those of small-pox fever (*Febris variolosa*,) yet without any eruption, have been observed by Sydenham; and the distinction has been received by Borsieri, Vogel, Lentin, Peter Frank, Hensler, and others.

§. II. The anatomy of the skin in small-pox, and the examination of the pustules, has attracted the attention of Sarcone, Cottugno, John Hunter, Wrisberg, Cruickshank, and Joseph Adams; but the inquiries have given rise to rather variable results. The

truth is, that the state of the pustules and variolated skin differs in the distinct and in the confluent small-pox, and also in the different kinds of the latter. For an account of the observations of Cottugno, John Hunter, Joseph Adams, and Mr Cruickshank on this point, I refer to my Elements of Pathological Anatomy (Chap. xxi. Sect. ii. p. 623;) and I shall here state shortly what I conceive is established by accurate observation, either by others or by myself.

Small-pox eruption consists in the distinct variety of circumscribed points of inflammation (*phlyctidia*;) developed simultaneously in many spots of the corion or true skin. These inflamed spots (*phlyctidia*) commence from very minute central points (*stigmata*) at the cuticular or outer surface, and at once spread by radiation along the surface, and penetrate to a depth greater or less in different circumstances. Each *phlyctidium* is surrounded in the course of two or three days with a hard red circle somewhat raised, which may be conceived to indicate the process of cutaneous inflammation, which proceeds to the secretion of matter. In the distinct disease this suppuration may be without ulceration, but is sometimes, though rarely, associated with it. On cutting open the *phlyctidia* of distinct small-pox on the eighth or ninth day, we find an opaque purulent semifluid matter in the centre, surrounded by a whitish spongy mound, and on gently removing the matter by charpee or sponge, we see the surface of the true skin, hollow or cup-like, red, rough, or villous and vascular, but not ulcerated, and presenting in the middle the red central point, but no slough. These incisions, which I have often made, always stopped the progress of the pustule, which was next day dry, less red and inflamed, and like a cicatrix or scab. If they be cut open at an earlier period in the living body, there is seen in the centre nearly of each a crimson red vascular point, which is the centre or focus of action to each. (*Stigma variolosum*; *Germe variolosum*, Sarcone; *umbilicus*, Cotunnii.)

In the *phlyctidia* of the coherent and confluent sorts some differences are observed.

These pustules, though generally circular in shape, may be elliptical or irregular, and when confluent their figure is not easily determined. Though raised more or less above the level of the skin, they generally sink a little after death, in consequence of loss of the thinner part of the matter. If they are well dis-

tended with their contained fluid, considering the difference of the days, the stages of the disease, and the state of the pustules, they resemble the half of a globe or the segment of a sphere, others are of a parabolic, others resemble a hyperbola, and terminate in a pointed summit, while others, beginning to sink, become flatter, and generally present in the middle of the pustule a depression more or less deep, corresponding in situation to that place where the first variolous point or focus, (*Germen variolosum*,) of the suppurative inflammation appeared.

Though all the cutaneous tissues are affected by the variolous inflammation, the *corion*, however, or *cutis vera*, suffers most. Wrisberg, on cutting open a few of the most distended *phlyctidia*, where they rose above the skin, recognized the following facts. On cutting the coverings of the *phlyctidia* a very fluid reddish liquor flowed from their cavity. Two variolous *phlyctidia*, opened and inverted, resembled, by the depth of their cavity, small plates or cups. The walls of the *phlyctidia* are one-third of a line thick; and the coverings of the neighbouring pimples coalesce in such a manner that two cavities communicate and form one. Exposed to the light they present different degrees of transparency, corresponding with the variable thickness of their walls. The most tender and the most transparent part is the tip of the *phlyctidium*, and it becomes gradually less transparent the thicker the wall is, that is to say, the nearer it approaches to the surface of the skin. The raised part of the *phlyctidium* consists not of *epidermis* only, but another substance to be mentioned presently. The external covering and the foundation of the whole *phlyctidium* is formed by epidermis; and within its cavity, and especially in the margins of the *phlyctidium*, where they spring from the skin, is found a thick substance of a consistence almost mucous, but which, when scraped off by the knife, which is very easily done, forms a granulated pulpy mass. Wrisberg was in doubt whether this substance were the mucous coat of the reticular part of the skin, the skin itself and its nervous *papillæ*, or a peculiar new product formed by the disease. From examining several *phlyctidia* of different kinds in the same manner, I think it clearly results that this thick mucous substance is a new product. But it further appears to me, that it is the matter which has been mentioned by Hunter as the variolous slough. The bottom of each *phlyctidium* presents the papillated part of the skin elevated and marked with fissures and chinks,

varying in diameter according to the size of the pustule, and smoother the more fluid its contents are, but showing the papillary structure more distinctly in the dry than in the moist state.

The first object recognized in any part exposed to natural variolous pustules is the reddish point (*Stigma variolosum* ; *Ger-men variolosum*, Sarcene, *umbilicus*, Cotunnii,) more or less deep, but with the epidermis left entire. This constitutes the centre of the future pustule, and soon forms a circle (*halo*,) variable in breadth, and of a red colour more or less deep. The elevation of the cuticle, and consequently the formation of the phlyctidium, does not begin until from the vessels of the red central point the several fluids are secreted, from the clearest serum to blood, and different forms of bloody fluid.

On the third, fourth, or sixth day of the disease, injected variolous skin shows in the site of the *stigma*, the most minute vessels tinged with the injected colouring matter. In *phlyctidia* of benignant character, that is, those which are to undergo a good suppuration, towards the sixth or seventh day, Wrisberg found the turpentine of the injection only transuded into the cavity of the phlyctidium without the cinnabar; but in putrid *phlyctidia*, and those of a malignant character, he observed the coloured wax extravasated.

The cellular part of the skin forming the base of the pustules in actual suppuration is swelled and moist like a sponge, presenting distinctly to the eye all its *papillae*, with their chinks, fissures, and eminences. These undergo little change from the natural state, if suppuration proceeds in its usual and regular train. But in pustules filled with eroding and stagnant matter, the papillae are injured, and being forced into suppuration, the chinks and fissures are obliterated, and in short those changes are effected, which upon recovery present the skin marred with scars, more or less considerable.

In the middle of the phlyctidium is seen the central point variable in height, from which at this stage proceeds the suppuration as from the former the inflammation, as from a centre to the circumference, corresponding to the *stigma* of the incipient or inflammatory stage of the disease. In distinct benignant small-pox, this part is of a bright red colour; but when the strength is impaired it is pale, in malignant small-pox it assumes a brown colour, and in gangrenous small-pox it becomes quite black. This central point sometimes contains extravasat-

ed blood, which is generally the indication of approaching gangrene.

In flat shrunk pustules proceeding to exsiccation, the part of the *epidermis* which was a little before elevated is then so intimately united to the base of the pustule, that it cannot be detached by loosening the margin of the pustule, and when drawn by the forceps resists and comes away in fragments. In those in which exsiccation is completed, the *epidermis* is loosened spontaneously, the detachment commencing at the centre, and proceeding towards the circumference, where it adheres longest, until here also it drops off in the form of scales. Upon the separation of the whole *epidermis* there remains in the centre an eschar, entirely similar to those which are left afterwards. This gradually diminishes, is then loosened at the margins, and, though it adheres long at the centre, is there also loosened and drops off.

It thus appears that the slough mentioned by Hunter is not an invariable circumstance. From the observations of Cruickshank, indeed, combined with those of Wrisberg, and what we observe in cases of small-pox terminating fatally, it results that though the slough may occur from the commencement, yet *phlyctidia* may exist even in confluent small-pox without it. It is allowed by Adams to be wanting in the vesicular small-pox, which appears after cow-pox.

§. III. DISTRIBUTION AND LIMITS OF THE ERUPTION.—Small-pox pustules are distributed generally over the whole cutaneous surface and the entrances of the mucous membranes. Over the skin, however, they are not distributed in equal degrees of profusion. Thus the face always presents the greatest number of *phlyctidia*, and next to this the upper extremities. Over the extremities they are generally distributed more abundantly than over the trunk, in which the number of pustules is often small. But, as has been already stated, on the lower extremities they are either small and imperfect, or they form by confluence considerable masses of blistered skin which irritate much, and do not suppurate well.

Pustules are also found at the entrances of all the mucous membranes; in the nostrils, the eyes, the margins of the eyelids, the *prolabium*, lips and gums, the tongue and its base, the palatine arch and velum, the inner membrane of the cheeks and the uvula. In the eye I have seen a pustule attack the cor-

nea, produce ulceration and perforation of that membrane, causing the escape of the aqueous humour and prolapsus of the iris, then iritic inflammation and adhesion, and complete loss of vision, with collapse of the eyeball. The external ear is often occupied with pustules as far as the aperture of the *meatus*, but Wrisberg states that he never observed pustules within that canal. In like manner the skin of the scrotum and penis, the prepuce and glans, and the frenum, and in the female the *labia*, *nymphæ*, clitoris, hymen, and *frænulum*, and in both sexes the muco-cutaneous membrane of the anus to the termination of the rectum in the sphincter, he has seen extensively occupied with pustules, but never found in one body in many dissections a true variolous pustule within the canal of the urethra, or the *vagina*, or the rectum.

On the subject of variolous pustules in the internal organs, I shall afterwards speak.

§. IV. MORBID ANATOMY AND PATHOLOGICAL DEDUCTIONS.
—The appearances found after death vary according to the symptoms during life, and according to the stage of the disease.

It is remarkable that in the bodies of those destroyed by small-pox neither the brain nor its envelopes present peculiar marks of great disorder. Even in those cut off by convulsions or *coma* there is seldom more than some vascularity of the membranes, some serous effusion into the subarachnoid tissue, and some fluid in the ventricles and in the spinal *theca*. This is a clear proof that the convulsions, sopor, *subsultus*, *typhomania* and *coma*, depend rather upon simple distension of the blood-vessels than upon inflammation, and may produce fatal oppression of the brain without giving rise to morbid products. This distension or irritative orgasm, however, does not appear to be greater in the cerebro-meningeal vessels than in those of other parts, and it is not greater in small-pox than it is in other acute cutaneous eruptions, and in fevers.

The mucous membrane of the nostrils, throat, *larynx*, wind-pipe, and bronchial tubes, is the great seat of disorder in small-pox.

This is put beyond all doubt by the dissections of Haller; of Cottugno in the Naples epidemic of 1770; of Henry Aug. Wrisberg in the epidemic which prevailed at Goettingen in 1766–1767; and by those of J. C. Reil in the epidemic which prevailed during the summer and autumn of 1771 at Halle.

Haller found in a case fatal on the fifteenth day, besides a dark purple colour of the intestines and inflammation of the *omentum*, the mucous membrane of the windpipe mortified, and both lungs black. Cottugno found in two cases fatal on the seventh day, and one on the ninth, the mucous membrane of the windpipe and *bronchi* much reddened, in one the tracheal membrane covered by a new membranous whitish crust, easily separable, in one the membrane of the glottis inflamed, and in one covered with minute pustules.

In all the bodies inspected by Wrisberg, without exception, the mucous membrane of the throat, especially that of the tonsils, epiglottis, and larynx, were inflamed, and the vessels were filled with so great a quantity of blood, that not only the veins and arteries could be distinguished in their minutest twigs by colour and diameter, but their mutual anastomoses were clearly discerned. These traces of inflammation were the more clearly seen the less the mucous follicles were obstructed, or the membranes covered with other coatings. In all the bodies, also, the mucous follicles of these parts were filled with viscid whitish mucus, sometimes purulent. The mucous membrane of the bronchial tubes and their branches was greatly reddened, the mucus often tinged with blood. The lungs were generally gorged with much blood, heavy, and sometimes loaded with vomicae. The bronchial glands were turgid, livid, often indurated, and sometimes full of purulent matter.

In one case Wrisberg found the inner surface of the windpipe covered with a species of wart-like growths. A few of these were found in the inner surface of the thyroid cartilage, more on that of the cricoid cartilage, and near the arytenoid and their articulation with the cricoid cartilage. But the greatest number were found in the canal of the windpipe, where they were, however, not confluent, but distinct. In the bronchi their number diminished; and in the tubes they were not observed. They varied in size, from a small lentil to a grain of hemp-seed. Some resembled round points; others were oblong in shape, and generally of the figure of variolous pustules on the fourth or fifth day after eruption. In elevation they resembled whitish pustules, the largest of them having a small depression in the centre.—(Wrisbergii Commentationum, §. 16, p. 75.)

In several cases, the *pleura pulmonalis*, and *costalis*, and *diaphragmatica* adhered by false membrane.

Reil has recorded the particulars of eleven cases, fatal on the seventh, ninth, eleventh, or fourteenth days, in which the internal organs were inspected with some minuteness after death. In seven of these the mucous membrane of the *larynx*, *trachea*, and bronchial tubes was in different degrees reddened, vascular, covered by viscid mucus, sometimes bloody. In three, the membrane of the glottis was thickened, swelled, hardened, and more or less rough or warty. In one, the surface of the windpipe was covered with fragments of white membranous coating. In six cases, the lungs, one or both, presented marks of inflammation; in one case, the left lung, besides being inflamed and adhering, presented two *vomicæ* as large as a walnut; and in one case, the right lung contained an incipient but purulent abscess. In four cases adhesions connected the pulmonic to the costal or the diaphragmatic pleura. In three cases, there was serous fluid, varying from one ounce to three, found in the pericardium. The right chambers of the heart were generally full, sometimes distended with blood. The left were most commonly empty.

These facts I have confirmed by inspections by myself. In the body of a woman of about 35, cut off on the fourth day of an attack of confluent small-pox, I found the mucous membrane of the larynx, windpipe, and bronchial tubes much reddened and injected, and the whole tracheo-bronchial membrane covered by a very thin grayish coating like tissue-paper spread uniformly over it. The bronchial tubes contained much frothy serous mucus.* In other cases I have found general swelling and redness of the laryngeal and tracheal mucous membrane, sometimes imperfect pustules in the *glottis*, and always *œdema* of that part.†

The mucous membrane of the alimentary canal also suffers, though less severely and less frequently. Wrisberg found in most bodies the villous membrane of the whole alimentary canal inflamed, in many affected by gangrene and sphacelus, so that large patches were abraded, or converted into dingy-coloured eschars, as in dysentery. In almost all the intestinal glands, both the solitary follicles and agminated glands, in the *ileum*, and the muciparous glands of the colon, were remarkably swelled, elevated, prominent, and indurated. These ob-

* Edinburgh Medical and Surgical Journal, Vol. xli. p. 304.

† Elements of Pathological Anatomy, p. 706.

structed follicles were very abundant in the vermiform process. With these indurated glands were intermingled in many bodies numerous petechial spots, varying in size and colour, but often brown, and containing dissolved blood extravasated into the cellular tissue.—(Commentationum, §. 13, p. 77.)

Reil in like manner found in some of his cases the intestinal mucous membrane reddened and injected, and occasionally mottled with petechial and other dark-coloured spots and patches. *

The genito-urinary mucous membrane is occasionally reddened, injected, and villous in the bodies of persons cut off by small-pox.

Before quitting this part of the subject, I may shortly advert to the question of the existence of small-pox in the internal organs.

It has been a doctrine taught by a great number of authors, that, in small-pox, variolous pustules are formed in the internal organs, especially along the surface of the different mucous and serous membranes; and many have adduced the evidence of dissection, to show that variolous pustules were generated in small-pox in the œsophagus, stomach, intestinal tube, in the membranes of the brain, in the *pleura*, *pericardium*, and *peritoneum*, in the liver, spleen, and *pancreas*, and even in the womb.

The existence of variolous pustules on these parts has, on the contrary, been denied by Lentilius Rosinus, Hoffmann, Beusser, Roederer, Haller, Storck, Tissot, Cocchi, John Hunter, Cotugno, Wrisberg, and Reil; the three last of whom have adduced evidence which must be regarded as quite conclusive.

Pustules, or vesiculo-pustular eminences are found in the mucous membrane of the nostrils, mouth, cheeks, palate, and fauces, as far as the *epiglottis*, and even the *glottis*. But these eminences do not resemble either in progress or contents the genuine variolous *phlyctidium*. In the museum of Mr Heavyside is a preparation, showing the appearance of pustules of the mucous membrane of the pharynx, and half way down the œsophagus; and Sir Gilbert Blane records an instance of fatal confluent small-pox, in which the whole mucous surface of the œsophagus, stomach, *duodenum*, and intestines, to the rectum, is reported to have been occupied with small round ulcerated

* Memorabilia Clinica, Vol. ii. p. 121, and 122, &c.

spots.* These statements, however, are not adequate to establish the conclusion, that the gastro-enteric mucous membrane is liable to variolous pustules. Though Wrisberg and Reil found on that membrane similar ulcerated and abraded spots and patches, they recognized no genuine variolous pustules. We know also that the isolated follicles, when enlarged and inflamed, are so similar to variolous pustules, that they are liable to be mistaken for these, and have even been mistaken by so able an observer as Cruveilhier.* In short, I infer that the bodies which various observers have regarded as variolous pustules are either inflamed and enlarged, or hypertrophied follicles, or ulcerated follicles, or, in short, ulcerated spots or petechial patches of the gastric or intestinal mucous membrane. With regard to the variolous pustules said to be found in the *pleura* and *peritoneum*, these are miliary tubercles of these membranes.

Is it from this to be concluded, that the variolous action is confined to the skin, and does not affect other tissues? Such conclusion would certainly not be legitimate. Though the variolous action evinces its principal, and what may be termed its pustulating effect on the skin, it operates on other tissues, especially the mucous, in a different mode. Though it does not form pustules on the mucous membranes and in the internal organs, it is quite capable, nevertheless, of producing acute, diffuse, or general inflammation in these membranes. This it does in every form of small-pox, both distinct, coherent, and confluent; and though, on the eruption of the distinct small-pox, the symptoms of this disorder of the gastro-enteric and tracheo-bronchial mucous membrane are much abated, its existence is still demonstrated by the liability of the latter membrane especially, to assume the irritative and inflammatory action. In the coherent and confluent forms of the disease, again, the mucous membranes, but especially the tracheo-bronchial and pulmonic, are always more or less affected, and when the disease proceeds to the fatal termination, it is chiefly by the intense disorder of the pulmonic membrane and the lungs, that this result takes place. It has been also said, that death may be induced by the nervous disorder, and by the shock given to the nervous system, that is, I presume, by affection of

* Transactions of a Society, Vol. iii. p. 425.

† Médecine Pratique éclairée par l'Anatomie et la Physiologie Pathologiques par J. Cruveilhier, I. Cahier, Paris, 1821, 8vo.

the brain, spinal chord, and nerves. The existence and influence of this affection, I do not deny. But as I have seen several instances in which this was believed to be the cause of death, yet in which an important lesion of the tracheo-bronchial or pulmonic mucous membrane was found, it appears to me that it is a much rarer cause of the fatal termination in small-pox than is generally believed.

This tendency in small-pox is observed not only in its actual symptoms, but in its effects and consequences. Thus small-pox, though not fatal by the disorder of the tracheo-bronchial and pulmonary mucous membrane, may leave after it various traces of its action in different parts of that membrane, or its junction with the skin. Thus it may induce tarsal *ophthalmia*, chronic inflammation of the mucous membrane of the eyelids, lippitude, chronic inflammation of the cornea, terminating in specks, opacities, and ulcerations, or even destruction of the eye; inflammation of the lacrymal duct and sac inducing *fistula lacrymalis*, with or without caries of the *os unguis*; chronic inflammation of the nasal mucous membranes, or that of the *antrum*, inducing *ozæna*, and sometimes caries of the nasal bones; chronic inflammation of the *meatus auditorius* or the tympanal cavity, inducing purulent discharge from the ear, loss of the bones, and deafness, partial or complete; chronic laryngeal inflammation, chronic *bronchitis*, or even peripneumony giving rise to phthisical symptoms, chronic pleurisy terminating in empyema, and even pulmonary tubercles, and consumption itself. The existence of these affections is denoted by their characteristic symptoms. It may leave also chronic inflammation of the intestinal mucous membrane, causing obstinate diarrhoea and enlargement of the mesenteric glands; obstinate ulcers of the skin; and it has been known to cause caries of the bones, *ankylosis*, *spina ventosa*, and other obstinate diseases. These effects are always most conspicuous and most frequent in individuals of the strumous habit.

Reil has been at some pains to inquire into the reason of this affection of the tracheo-bronchial and pulmonic mucous membrane in small-pox, and has recourse, in order to explain its occurrence, to the assumption of an alienated action of the nervous system (*alienata systematis nervosi actio*), or disorder of the pulmonary nerves, in consequence of disorder of the cutaneous nerves. This disorder of the pulmonary nerves may

or may not be the fact. But its assumption does not enable us to understand the reason of the occurrence of bronchial or pneumonic inflammation, better or more clearly than by admitting it to be an ultimate fact, and a fact in connection with those indicating the mutual physiological relation of the skin and the mucous membranes generally.

Instances of complication with measles have been observed by Diemerbroeck, Sidobre, Bergius (*Act. Acad. Reg. Scient. Suec.* xxvii. 1766,) Jones, Manget, (*Ed. Med. Comment.* Vol. i.); King, (*Ed. Med. Com.* Vol. iii. 443.) ; Russell, Tracey, (*Med. Repos.* iii.); Maurice, (*Med. and Physical Journal*, v.) and De La Garde, (*Medico-Chirurg. Transact.* xiii.) In general the effect is to retard and slightly to modify the eruption of small-pox. In some of the cases the small-pox did not completely come out and fill till the measles had disappeared.

§. V. ETIOLOGY.—It is almost universally admitted among physicians, that small-pox depends upon the existence of a peculiar and specific animal poison, which is liable to affect the human race in two different modes, either through the medium of the atmosphere, or by direct contact. In the former case, the atmosphere is said to be tainted, infected, impregnated with variolous effluvia, or variolated, and the disease is said to be communicated by infection. In the latter case, in which direct contact takes place between the persons of the sick, or clothing, bedding, or similar articles, impregnated with variolous matter or effluvia, the disease is said to be communicated by contagion. Between these two modes of communication, however, there is probably less real difference than is imagined. In both the air seems to be the chief medium of communication; and the only difference is in the circumstance of the poison being applied in a more direct and concentrated form, in so far as the atmospherical space is more limited. As the propositions now announced, however, imply a certain degree of generalization, the most proper method may be to state shortly the principal facts on which they are founded.

It is observed that small-pox may prevail either epidemically or sporadically.

Previous to the introduction of vaccination, and occasionally even since that event, small-pox have been observed to occur more or less in all large and populous communities during the whole year, and to affect, though mostly young children, yet persons

of any age. The occurrence of the disease, in these circumstances, is not observed to be in any degree under the influence of season, weather, atmosphere, temperature, climate, or any similar agent. Small-pox are said then to be *sporadic*, and by some authors, as Dr Haygarth, to be casual.

During certain years, however, the disease is observed to become much more prevalent than usual, and to affect much greater numbers of the community, sparing neither age, sex, nor constitution, among those who have not previously undergone the disease. Small-pox is said then to be *epidemic*, and the season is said to possess a variolous constitution. In general it begins to appear in this character in the temperate countries of Europe about the vernal equinox, increases during summer, declines in autumn, and subsides in winter; but may appear again in the ensuing spring. When it appears early in the winter, as in November, December, or January, the cases are more general, confluent, irregular, and malignant, and the mortality is greater. Though these may be regarded as general facts, exceptions nevertheless occur. Van Swieten mentions a small-pox epidemic, which began to prevail in November and December, yet in which the eruption was regular and benign, and accompanied with small mortality.

In small-pox epidemics, it is generally observed that the number of cases increases as the spring advances and summer approaches, and at the same time that the symptoms are more severe, and the mortality greater. When the weather is warm, the month of September is said by Van Swieten to be remarkable for the number of cases and deaths. In general it has been observed that the cases are less numerous and less severe in the winter. In the epidemic of 1666, on the other hand, in France, it was observed that the most malignant form of the disease prevailed much more generally, and destroyed a larger proportion of persons during the severe cold of winter, than in the hot summer. The general testimony of medical observers, however, sufficiently establishes the conclusion, that in spring and autumn the cases of this disease are milder and more regular than at any other season.

It further appears that in hot dry summers and in cold dry winters equally, small-pox are greatly more severe than in moist summers and in mild winters. At Montpellier in 1746, small-

pox, during a hot dry summer, raged with such fatality, that it destroyed 2000 persons in a few months. (Arnault, *Mem. de l'Acad. de Paris*, 1748, p. 527.) Several facts illustrative of the same principle are recorded by Hillary, Wintringham, and Malouin. Is it on the same principle that is to be explained the fact mentioned by many, that in Egypt and in Greenland small-pox has been particularly malignant, and caused very remarkable mortality? It must be admitted at all events, that these undulations in the relative prevalence of small-pox in different seasons and in various climates, with the subsidence of the disease in the end of autumn and beginning of winter, as shown by the bills of mortality, prove the influence of different states of the atmosphere both on the diffusion and on the mortality of the disease.

In the beginning of any epidemic variolous constitution, the disease attacks principally infants and young persons. But as the summer advances and autumn approaches, it attacks adults and even aged persons, and evinces more decided marks of capillary disorganization, as bloody vesicles, petechial spots, hemorrhage, and actual gangrene.

It has been already said, that in large and populous places, as London, Manchester, Liverpool, Birmingham, Glasgow, and Edinburgh, small-pox almost always exists in some part of the town. It has also been observed, that while one part of a large town is completely free from cases, they may be more or less numerous in another locality. (Mr Henry's Letter to Dr Haygarth.) In October 1789, the disease was very prevalent and fatal in the suburbs and outskirts of Manchester, and of rare occurrence in the central parts of the town.* This, however, Dr Haygarth regards as a proof not of epidemical influence, but of infecting power and contagious propagation. (See Inquiry, p. 93, &c.)

The facts now specified are believed to indicate the existence of what has been denominated since the time of Sydenham the epidemical variolous constitution of the atmosphere. Its existence and influence have been maintained by Al-Rhasi, Mercurialis, Marcellus Donatus, Sydenham, Hoffmann, Ramazzini, Richa, Boerhaave, Freind, Mead, Van Swieten, Hillary, Clifton Wintringham, De Haen, Huxham, Patrick Russell, Hensler, Sarcone, Cottugno, Borsieri and Frank, but denied by Lis-

* Haygarth's Sketch of a Plan, p. 370.

ter, Francis Maria Scuderi,* and Haygarth,† who ascribe the production of the disease exclusively to the operation of a contagious or infectious principle. I have now, therefore, to refer to the facts which are adduced to establish the existence and operation of this agent.

Small-pox is liable to attack persons at all ages, in every rank of life, and of both sexes. Though it is observed that small-pox generally attacks subjects in early life, yet there occur instances in which, from some peculiar causes, persons live many years before they are attacked. Van Swieten mentions the case of an old woman who, though in early life, when her brothers and sisters were infected by the disease, she had been in the closest communication with them, was not attacked, and who had the disease at 60 years. Schelhammer saw it in 1796 destroy several aged persons in Alsace; and Hensler mentions that in 1753 at Paris two persons of distinction, aged respectively 72 and 79, died of the disease.

It has been observed by Haygarth and several of his correspondents, that, if two persons be exposed for the first time to emanations issuing from the bodies of those labouring under the disease, it rarely happens that both escape the disease; and if three persons be exposed to the neighbourhood of variolous patients, much more rarely do all remain uninfected. The numerical chance of the former event is calculated to be at the rate of 400 to 1; that of the latter at the rate of 8000 to 1.* (Haygarth Sketch of a Plan, p. 535.)

Is it also certain that no instance occurs of small-pox attacking any person who has not been previously exposed to the neighbourhood of an individual labouring under the disease, or to the contact or neighbourhood of his clothing or bed linen? It is remarkable that this question, though it is by far the most important in the whole inquiry, is nowhere stated by Dr Haygarth. Whence are the first cases derived in any given epidemic? From what source, for instance, could the first cases be

* Memoria in piu ristretta forma, &c. Dal Sacerdote Dottore in Filosofia e Medicina D. Francesco Maria Scuderi Viagrandese, del Regno de Sicilia; per servire alla intiera et perfetta estinzione del Vajuolo, e de tutti gli altri Morbi Contagiosi, &c. Napoli, 1787. xvi. p. 12. Supplemento Alla Memoria, Napoli, 1788. This author maintains that the Athenian plague, described by Thucydides, was the small-pox, and that the disease was known to the ancients, though under different names.

† Inquiry how to prevent the small-pox, p. 14, &c. and p. 111 to 115. Sketch of a Plan, p. 57 and 557, conclusion.

derived of the epidemic which prevailed in Ceylon, during the year 1833 and 1834? There is manifestly in this part of the inquiry a great difficulty in the circumstance, that in cases which cannot be traced to exposure to any previous cases, the impracticability of doing so is attributed to the carelessness of observers, and sometimes to the desire to conceal the fact. The usual mode in which the objection is answered, is that in large towns, the disease is never wholly absent, and in these it is difficult if not impossible to trace the contagion, on account of the innumerable modes in which communication is carried on. (Ph. Gab. Hensler, *Tentaminum et Observationum de Morbo Varioloso Satura*, p. 7.)

From facts of this kind it is inferred that the healthy are infected from the sick, by receiving into their persons some noxious principle of the nature of a poison, and which emanates from the bodies of the sick. It is well ascertained that absolute contact with an affected person is not requisite to produce the disease, since persons who have merely entered the apartment of the sick, or even the house in which a small-pox patient was, have occasionally been attacked by the disease. (Van Swieten, §. 1382.)

As this principle is neither visible nor tangible, nor capable of being proved to exist unless by its effects, the great object of pathologists and physicians has been, next to proving its existence, to ascertain its nature and properties, and to discover the circumstances under which it operates, and is prevented from operating, or to ascertain the laws by which its operation is regulated. To these properties, and the evidence of their existence, I shall very soon advert.

Conversely, it has been observed by Huxham, Hensler, and many others, that some persons, though exposed most freely to variolous effluvia, evince no indication of becoming affected by the disease. In a body of men amounting to between 1200 and 1400, all had passed through small-pox excepting about 1 in 20. In the records of the Newcastle Dispensary, not more than 22 in 833, or about 1 in 38, were incapable of receiving the disease by inoculation.* Hence has arisen the doctrine of susceptibility and insusceptibility. There may be three species of immunity or rather insusceptibility to the disease; one depending on family peculiarities, one depending on individual peculiarities, and a third depending on some temporary

* Sketch of a Plan, by Dr Haygarth, p. 534.

cause. The two latter are the most frequently observed. I have seen a boy otherwise healthy and unvaccinated, while his brothers and sisters were passing through the disease, in the most unrestrained intercourse with them, yet escape it entirely; and subsequently when he grew up to manhood exposed to the disease, yet without contracting it; and many similar instances have occurred to others. Hensler mentions two examples of persons who were very freely exposed to variolous emanations, yet did not show susceptibility to the disease. In one, a woman of 30 nursed and attended four of her children, labouring under small-pox, and suckled one, yet did not receive the general disorder. Twice, however, on the breast there appeared several variolous pustules, which, after slight suppuration at their *apices*, dried and disappeared without leaving any trace. (Tentamen. iii. p. 36.) Similar examples are mentioned by De Tharding and others. The temporary immunity is best illustrated by the instances of those persons who, though subjected to average exposure, escape the disease in early life, and afterwards contract it in adult or old age. Such attacks were explained by Rhazes, by referring them to the pestiferous, putrid, and malignant state of the air; in other words, to a very intense degree of the epidemic variolous constitution.*

Though none of the authors who have treated on this subject have spoken with much precision, we are given to understand that the variolous or rather the variolific poison (*virus variolosum*) is a subtile vapour, exhalation, or effluvium, invisible, impalpable, but occasionally said to exhale a peculiar odour.† That it floats in and is conveyed by the air was taught by Boerhaave and Van Swieten (§. 1382;) because it was impossible to distinguish any other channel by which it could be conveyed. Haygarth maintained that it was soluble in the air, and that it was in this form by inspiration received into the system. This assumption, however, was gratuitous, and, if not rejected, was at least by no means generally admitted. It further appears to have involved its author in an inconsistency; as he is obliged in another part of the same work, in order to explain the occasional innocuousness of the variolous poison, to have recourse

* De Variolis et Morbillis Commentarius, Cap. i. p. 113, Mead's edition.

† This supposed *effluvium* or variolous vapour has been also denominated *miasm* by Quier, Borsieri (*miasma variolosum*) Haygarth and some of his correspondents. This, however, is not a very accurate application of the term, *miasm*, which has been employed chiefly to denote the terrestrial vapours, or those supposed to issue from the surface of the soil. It is more correct to confine to this the term vapour, effluvium or exhalation.

to the idea that it is dissolved in the atmosphere.* If the variolous poison be really a subtile vapour or effluvium, it seems sufficient to infer that it is suspended in the atmosphere, and conveyed or conducted by that body.

The persons of small-pox patients do not seem to be capable of communicating the disease with equal facility and certainty at all times. From the observations of Dr Haygarth and Dr Heberden, it results that the person of a small-pox patient previous to the appearance of the eruption does not communicate the disease. (Inquiry, p. 49 and 52.) The time at which the persons of variolous patients cease to be capable of communicating it, is not ascertained with equal precision. Dr Haygarth concludes that, so long as a variolous scab or crust remains, or any thing containing the variolous matter in any form adheres, the individual may be capable of communicating the disease. On this point he remarks, that in 90 single cases the shortest time from the commencement of the eruption to the decision of the last crust was till the tenth day, and the longest was till the fortieth day; and of these in 16 only was this period later than the twenty-eighth day. In the case of *families*, where two individuals are liable to small-pox, one receiving the disease from the other, among 31 cases, the shortest period from the appearance of the eruption on the first to the decision of the last crust on the second, was till the eighteenth day, and the longest was till the fifty-third day; and of these only two were later than the forty-third day. In the case of *families*, in which three individuals were liable, among seven cases the shortest period was the twenty-third, and the longest the sixty-third day. From these facts it would result that the person of a small-pox patient cannot communicate the disease before the fourth day, or even perhaps before the seventh day, and after the forty-fourth day. In the case of families, however, this power does not cease till about the fifty-seventh and the sixty-seventh days. (Inquiry, p. 54, 55.)†

At any time comprised between the two epochs now specified, that is, between the seventh and the forty-fourth day from

* "The variolous poison, if exposed to the air for a sufficient time, is probably deprived of its infectious quality, being dissolved in the atmosphere." "When the variolous poison ceases to dissolve in the air, it ceases to produce the natural small-pox." Inquiry, p. 110. This I do not understand. The variolous poison is supposed to be dissolved in the air to produce its effects and to be dissolved to become harmless and inert.

† "The shortest period is ten, and the longest sixty-three days."—Sketch, p. 183.

the first symptoms of fever, the person of a small-pox patient may communicate the disease. The period, however, at which communication is most likely to take place is during maturation, that is from the beginning of the eighth day to the end of the seventeenth. It is at this time that the person of the patient emits the rank odour peculiar to small-pox; and it may be physiologically inferred from the phenomena of the fever and the suppurative process that it is at the same time that the variolous virus is beginning to reproduce itself.

Not only is the peculiar odour of the variolous exhalation remarked at this period of the disease. It has also been observed that the variolous patient emits a species of heat, and that the vapour possesses certain acrimonious or irritating properties. Thus Cottugno remarked, that on the eighth day of the disease, he perceived to issue from the person of the patient a new atmosphere of heat, which on the ninth day became so intense that it could not be endured without great uneasiness. He felt it affect the hands even at the distance of two feet, as if he had exposed them to burning coals.* In proof of the irritative powers of this exhalation Hallé mentions the case of a man who, from assiduous attention to his wife, and laying in bed with her while affected with the eruption, was attacked on the fifteenth day of the disease with headach, pain of the loins, difficult breathing, and during the night of the fourth day was raised from sleep, with a profuse flow of fetid irritating saliva, which continued to recur every night for some time after.† Reil ascribes to the variolous exhalation caustic, that is, irritating, properties.

It next comes to be inquired, from what surface the variolous effluvium issues, or in what part of the body of a patient it resides? It seems, in the *first* place, to be certain, that the breath and pulmonary exhalation and the cutaneous discharge chiefly emit the peculiar odour and hot irritating vapour, remarked to issue from variolous patients. It is not ascertained whether the other excreted discharges contain this principle, though, from facts presently to be mentioned, it seems likely that they do. *Secondly*, Dr Waterhouse and others have recorded cases in which persons exposed only to the exhalation from the blood of small-pox patients have been afterwards attacked by the disease. This mode of communication, however, is doubted by Hunter and Haygarth. But if the blood do not communicate the disease,

* De Sedibus Variolarum Syntagma, p. 7. † Halle 1 Vol. p. 189.

it seems difficult to understand how the *foetus in utero* receives the infection; and of this there are numerous examples. *Thirdly*, it is well known that the purulent matter of the pustules if applied so as to be absorbed, produces the disease; and it has been stated, that even the matter applied over the skin is occasionally followed by the appearance of pustules. Dr Rush, on the contrary, applied lightly over the arms of four children, a thread strongly impregnated with small-pox matter; and after waiting the usual time found, that in none of them did it produce the disease; and the same experiment was performed by Dr Cowell with the same result. Dr Rush, therefore, denies that variolous matter rubbed on the surface of the skin can produce small-pox. It is said that the serum of the pustules may produce the disease; but this I question. The contents are serous until the eighth day, and it seems doubtful whether they, previous to this date, contain any of the specific *virus* of small-pox. *Fourthly*, many well authenticated instances have occurred of the exhalations from the dead bodies of those cut off by this disease, being capable of exciting it in those exposed and susceptible. This has been known to take place in anatomical rooms in London, and instances of its occurrence in the rooms in this city have been observed. This is certainly singular; for it might be imagined, that, as the body proceeds to decomposition after death, the matter of the pustules and all the fluids, and at the same time the variolous *virus*, would also be decomposed. It appears, however, to resist the influence of these elementary changes longer than any other animal poison.

In proof of the energy of the variolous *virus* even in the dead body, a remarkable fact is mentioned by Wrisberg. In early life, this anatomist had so profuse an eruption of small-pox that he not only had no fear in attending patients in the disease, but undertook with perfect security to handle, as if he were quite unsusceptible, the bodies of those destroyed by the disease. As often, however, as, in the course of injection, he touched, turned, or held bodies of this description when immersed in the warm bath,—an operation in which, he says, it was impossible to prevent some particles of the matter from being absorbed, so often in his arms did three, four, or even six genuine variolous pustules appear, and pass regularly through all their stages. *

* *Commentationum Medici, Physiologici, etc. Argumenti*, Vol. i. p. 54. Goettingae, 1800.

It is further asserted, that the dead body possesses for years this power of communicating small-pox to the living; and that the decomposition which takes place in the tomb is inadequate to destroy the variolous virus. Thus a story is related in the London Magazine, of small-pox having been derived from a body which had been thirty years in the grave. This statement, which seems neither credible nor consistent with physiological laws, may have arisen from some foolish exaggeration. But I know not what character to allow to the statement made by Jenner, and repeated by Dr Adams, that a boy attending a grave-digger, while he was re-opening ground, in which ten years before a person dead of small-pox had been interred, was soon after, in due course, attacked by the disease, which, from every inquiry, he could have derived from no other source.*

With regard to the channel through which the *virus* is received, it appears to be most consistent with sound physiological principles to believe, that it is inhaled with the air during inspiration, and being thus applied to the mucous membrane of the mouth, nostrils, windpipe, and lungs, is thence absorbed into the system. Van Swieten inferred that it may be swallowed during deglutition, and applied to the mucous surface of the œsophagus, the stomach and intestinal tube. Such a mode of application is certainly not impossible; but it is proper to mention, that Dr Cowell, an American practitioner in the Jerseys, caused a negro girl, whom he was requested to prepare for inoculation, to swallow with a dose of medicine a quantity of variolous matter, yet without communicating the disease.† It may be said, that this is only one case in which the virus applied to the gastric mucous membrane failed to produce its expected effects; and it may be added, that the poison might have been digested or otherwise prevented from operating. As such a mode of application, however, is unnecessary to the production of the effect, it seems more rational to think, that the process of absorption is performed at the surface of the respiratory organs.

Is there any reason to believe that the different modes of absorption can have any influence upon the rapidity or slowness of action; or is there any reason to believe that this circumstance can be employed to explain in certain cases, the sudden

* Adams on Morbid Poisons, second edition, London, 1807, p. 391.

† Medical Observations and Inquiries, Vol. v. p. 39.

appearance of the disease after exposure to the eruption or variolous effluvia?

The limits within which the operation of the variolous vapour or *virus* is confined seem not to be extensive. As the peculiar variolous odour is much more intense in the immediate vicinity of a small-pox patient than at a distance, and even in the same chamber, Dr Haygarth inferred, that, at the distance of a few yards, the poison is so much diluted as to impair much, if not entirely destroy, its power of producing the disease. From one of his cases, he infers that passing within half a-yard of a variolous patient is insufficient to produce the disease. (Inquiry, p. 100.) But it is to be observed, that in this case the exposure was momentary only, and in one of the individuals, who stopped a little longer, but did not approach more closely, the disease was produced. From the observations of Mr Dawson and Dr Percival, the experiments of Dr O'Ryan, and the facts recorded by Dr Currie, it results, at all events, that there is no reason to believe that its efficient operation extends beyond six or seven feet. Dr O'Ryan exposed six children, one hour daily for a week, to cotton impregnated with variolous matter, placed within half a-yard, without communicating the disease, and four children for one hour daily for two weeks, at the distance of half a-yard, from a person in the different stages of small-pox, without observing the propagation of the disease to ensue. In the case of the Guinea man, recorded by Dr Currie, eight persons were attacked with small-pox soon after leaving the coast of Africa. They were placed about twenty feet from the deck on the maintop, where they passed through all the stages of the disease; and their apartments were in the meantime washed and ventilated. The disease did not spread among the rest of the crew or passengers. (Sketch of a Plan, p. 444.) In this case there is strong reason to believe that the free ventilation to which the position of the patients exposed them, was the chief reason that the variolous effluvia did not affect any other person on board. From several other facts collected by Dr Haygarth, it appears that the variolous poison within a house is not infectious to any person without it, (Inquiry, p. 103,) and, consequently, that it does not render the air infectious to such a distance as to frustrate all human attempts to stop the progress of the disease. (P. 107.)

It has been very generally believed, that the clothing, bed-linen, and similar articles in frequent or constant contact with

the persons of variolous patients, become imbued or impregnated with the variolous *virus* or *effluvium*; and that articles thus imbued may communicate the disease to those liable. The justice of this belief was first called in question by Dr Haygarth, who adduced many arguments to show, that variolous *effluvia* or vapours could not and did not in all probability adhere to clothes, furniture, or articles of food which have been previously exposed to the atmosphere of a variolous chamber. The reason he chiefly assigned for this opinion was, that, as the poison is mingled with or dissolved in the air, since these articles could not absorb or retain air, they could as little be impregnated with variolous vapour, or long retain it. From this, however, he allows three exceptions;—one in the cases of gloves or boots, which, if pulled off in air strongly impregnated with variolous vapour, may retain a portion of it; another in the case of drawers or boxes, which, he allows, if opened in the apartment of the patient, may receive and retain the air then imbued with the effluvium; and a third, in the case of a full bottle emptied in a small-pox chamber, which would be immediately filled with variolated air, and if corked, might retain its contents for some time sufficiently pure to propagate the disease. (Inquiry, p. 77.)

Though Dr Haygarth thus maintains that articles of clothing, furniture, or food, cannot imbibe or retain the variolous vapour in such a manner as to communicate the disease, he does not deny that they may communicate the disease by means of variolous serum, matter, or crusts adhering to them, and thus conveyed to the sound but susceptible.

The accuracy of this part of the doctrine is not perfectly indisputable. Mr Henry of Manchester, father of the present Dr Henry Senior, mentions the case of a newly married lady, who danced at an assembly with a gentleman, who remarked that her person emitted a strong odour of small-pox. In a week after she sickened and died; and it was afterwards ascertained that several of the family of the dressmaker in London by whom her clothes had been made, had been ill of small-pox. In this case it is certainly possible that variolous matter may have adhered to some part of the clothes; but it seems also not unlikely that they were imbued with the variolous vapour. There is little doubt that small-pox has been communicated in this manner from the houses of tailors, habit-makers, milliners, and sometimes washerwomen.

Persons exposed to the operation of the variolous *virus* in any of the modes already specified do not immediately present the symptoms of the disease. A certain period has been observed to elapse, unless in some cases, between exposure and the occurrence of fever and sickening. This period was named by Haygarth the *latent period*, and more recently it has been distinguished as the period of incubation. The latent period in the casual or natural small-pox varies from the ninth or tenth, to the sixteenth or eighteenth day. Dr John Rutherford and Dr Fordyce inferred from various facts that it was from twelve to fourteen days. (Transactions of a Society, Vol. i. p. 5.) But in a very well authenticated case of a lady, of 76, at Gorton, near Manchester, the period was nine days, (Ibid. 231); and in the cases given by Dr Clark, the earliest period was the ninth day. (Sketch of a Plan, 420.)

From the rule now specified, however, of the latent period, being at the smallest limited in natural small-pox to ten days, an exception must be made. Several cases have been recorded by credible observers, in which persons have immediately on exposure been affected by the variolous action. Van Swieten mentions the case of a boy of seven, who, upon seeing the body of an infant dead of the disease, instantly began to sick-en, and had a severe attack; and Mr Horne, of Newcastle, mentions a similar instance of sudden and almost immediate attack in a young woman of twenty-five, who did not see the patient, but was exposed to the emanations issuing from an individual who had attended him. (Sketch of a Plan, p. 405.)

If the matter of a variolous pustule, taken after the commencement of the eighth day, be applied upon the surface of the abraded skin of a person who has not been previously affected by small-pox, or passed through the disease, this is followed, first, by the production of local irritation and inflammation, then at the end of six days in general, by fever similar to the eruptive fever, and next, after the lapse of three days more, by the eruption of a number of pustules more or less numerous.

In this mode of communication, which is denominated inoculation, the latent period varies from five days to fourteen, and in a small proportion of cases is protracted to sixteen, seventeen, and twenty-three days, so that in the space of from six to fourteen days after the variolous matter has been applied to the abraded skin, the eruptive fever commences. The disease produced is denominated inoculated Small-pox. In general, when

the disease is communicated by inoculation, it appears at an earlier period by about two days, than in the case of casual infection; a difference, when it does occur, to be attributed to the greater rapidity with which absorption takes place, when the matter is applied to the abraded *cutis vera*, than when the vapour is inhaled, and applied to the pulmonic mucous membrane.

It is also ascertained that matter taken before the eighth day does not communicate the disease, but merely induces irritation and inflammation of the parts.

It is ascertained, however, that the variolous crusts are capable of reproducing the disease, and they have been often successfully used for this purpose.

In the process of inoculation in the artificial production of the disease, we remark several important physiological points in the history of small-pox. We observe, *first*, a latent or incubating period, during which the matter is exciting inflammation, and perhaps undergoing absorption at the abraded surface. I say, perhaps, because it cannot be said to be ascertained that it is absorbed, unless the eruptive fever be admitted as a proof of this. *Secondly*, we observe that in the course of the eruptive fever, the small-pox matter applied reproduces itself, or rather reproduces new variolous matter in the frame of the individual to whom it has been applied. And *thirdly*, we find that this reproduced matter affects the whole constitution, and displays its effects in the form of an eruption, more or less general over the skin.

The practice of producing small-pox by inoculation is one of high antiquity, and seems to have been in the East, China, India, and Georgia, almost coeval with the history of the disease itself. From these regions it was imported about the close of the seventeenth century by a Thessalonian female to Constantinople, and was practised for nearly a century in that city, when it was conveyed to England by Lady Mary Wortley Montague in 1721. Its further application shall be noticed under the head of Prophylactic Treatment.

It is singular that the necessity of the eruption does not appear to have been universally recognized as a proof of the constitutional effects of the variolous poison; and the misconception seems to have led to various mistakes in the practice of inoculation. (See the second letter from Dr Glass to Dr Baker, Lond. 1767; the case of the Duchess of Boufflers by M. Gatti; Mr Dawson's paper in Medical Transactions, Vol. iii.

380; and the paper of Mr Kite in Mem. of Med. Society, Vol. iv. p. 114.) It may be regarded, however, as ascertained by a great number of authentic facts, that the occurrence of the eruption is the only test of the poison having affected the constitution.

It has been generally believed also, that the inoculated small-pox is a milder disease than the natural small-pox. Though this be true as a general proposition, it admits of exceptions; and it has happened not unfrequently that a very severe disease has ensued on the inoculation of small-pox matter.

I have now to advert to another circumstance in the history of the manner in which small-pox may be communicated. I allude to its appearance in the *fœtus in utero*, with or without previous affection of the mother. These cases have exercised the ingenuity and reflection of some of the most ingenious men in the profession; but the conclusions at which they have arrived have been confused, contradictory, and unsettled.

Though the transmission of the disease from the mother to the *fœtus* was doubted by Boerhaave, it was admitted occasionally by Mead and Van Swieten, and conditionally allowed by Sir W. Watson. Cottugno, without denying the facts recorded, avowed himself unable to perceive the reason of the transmission; and Mr John Hunter undertook the consideration of the question by making distinctions, which I must avow my inability to understand, and ended by arriving at no satisfactory result. As facts were accumulated by Bland, Lynn, Kite, Turnbull, Laird, Jenner, and others, the doctrine of the possibility of the transmission has been gradually gaining ground, though the mechanism by which it is effected is as little understood as ever. As it is of great moment, however, to form precise notions on this point, and as most of the contradiction has been the result of a confused mode of stating the facts, I shall distinguish them into the following three classes.

The cases which have been recorded by credible observers are of three different kinds. *First*, Small-pox has taken place in the *fœtus*, or the infant has been born with the disease with previous or simultaneous affection of the mother. *Secondly*, The *fœtus* or infant has been attacked with small-pox, without the previous or simultaneous appearance of the disease in the mother. And *thirdly*, A pregnant woman has been attacked with the disease, yet the *fœtus* has not presented any symptom of it.

1. Cases have occurred in which small-pox have appeared in the *fœtus* or the infant at or immediately after birth, after their

previous appearance in the mother. Of this kind cases were seen or recorded by Bartholinus, * Hoffmann,† Mr Derham,‡ Dr Mead,§ Sir W. Watson,|| Dr Smellie,¶ Ludwig,** Dimsdale,†† M. Fouquet,‡‡ John Hunter,§§ Dr Wright,||| Dr Bland,¶¶ Mr Roberts,*** Mr Jenner,††† Mr Lynn,‡‡‡ Mr Kite,§§§ Mr Turnbull,|||| Dr Laird,¶¶¶ Mr Forbes,**** Dr Jenner,†††† and Joseph Frank.††††

In all the cases of this class, it is impossible to doubt that the variolous poison having first affected the system of the mother, was then transmitted from her to the fœtus. It must also from these cases be inferred, that this transmission was effected by the blood and vascular system, however this may seem to be opposed by the fact, of no direct vascular communication between the mother and the fœtus. Direct vascular communication is, indeed, not requisite to the transmission of the poisonous principle; for if we can suppose it to be absorbed with the air from the mucous surface of the lungs, which, indeed, we must do, it is certainly more easy to believe, that when it has been taken into the circulation of the mother, it can then be conveyed by the utero-placental circulation into the system of the fœtus.

From these facts, indeed, we must infer, as Mr Turnbull, Dr Jenner, and Dr Laird have done, that the variolous virus may penetrate into the inmost recesses of the human frame.

2. Cases have occurred in which small-pox has attacked the fœtus *in utero*, or the infant at or immediately after birth, without the mother presenting at that time any traces or appearance of the eruption. Of this description, cases have been seen

* Epist. Med. Cent. ii. p. 682. † De Morbis Fœtuum, §. 2.

‡ Phil. Trans. xxviii. No. 337, p. 165.

§ De Variolis et Morbillis, London 1747, p. 66.

|| Phil. Trans. 1749, Vol. xlv. p. 238.

¶ Cases and Observations in Midwifery, Vol. ii. Collect. xviii. No. vii. Case i. Lond. 1758 and 1768.

** Adversaria Medico-Practica, Vol. i. p. 496, Lipsiae, 1770.

†† Present Method of Inoculation, p. 22. London, 1779.

‡‡ De la Petite Verole, Tome i. p. 297. §§ Phil. Trans. lxx. p. 128, 1780.

||| Phil. Trans. Vol. lxxi. p. 372.

¶¶ Med. Jour. Vol. ii. p. 205. *** Ibid. Vol. v. p. 400.

††† Med. Jour. Vol. vii. p. 165.

‡‡‡ The Singular Case of a Lady, &c. London, 1786.

§§§ Mem. Med. Soc. 1795, Vol. iv. p. 296. |||| Ibid. p. 365.

¶¶¶ Edin. Med. and Surg. Jour. Vol. iii. p. 155. **** Ibid. p. 307.

†††† Medico-Chirurg, Trans. Vol. i. p. 271, London, 1812.

‡‡‡‡ Prax. Med. Part i. Vol. ii. p. 318.

or recorded by Mauriceau, * Mead, † Cromwell Mortimer, ‡ Sir W. Watson, § Rosenstein, || Peter Orteschi, ¶ John Andrew Murray, ** Le Febure, †† Frederic Christian Höller, ‡‡ Joshua Van Iperen, §§ and Mr Forbes. |||

In the class of cases now enumerated a very different arrangement is observed, and one which seems more extraordinary and less easily explained than the last. That a poisonous principle already existing in the frame of the mother should be transmitted to the contents of the womb, is at least accordant with physiological laws in general. But that the foetus contained within the womb should exhibit the proofs of the action of a poison which has left no traces in the body of the mother, is a phenomenon which has excited some wonder. This, accordingly, Dr Cromwell Mortimer imputed to the influence of imagination, Sir William Watson to the great subtilty of the variolous effluvia, and Mr John Hunter to absorption of the variolous matter and its conveyance to the child, yet without previous affection of herself;—an obscure expression of the fact rather than an explanation. If we attentively consider the circumstances of these facts, they lead to the following inferences. The variolous poison may be taken into the vessels of the human body, and either produce its characteristic effects upon the system and upon the skin or not. In the case of persons upon whom it has already produced these effects, it does not readily again produce them, and in some persons, though it have not previously produced these characteristic effects, it does not readily produce them unless under very particular circumstances. In all the cases of the class now under consideration, either the mother has passed through an attack of small-pox, and her frame had thus been rendered less susceptible of assuming its manifest constitutional and local effects; or she is originally unsusceptible of being influenced by the variolous infection. Neither circumstance, however, renders her system

* Observations sur la Grossesse, &c. sur leurs Maladies et celles des Enfans nouveau nez. Paris, Observat. 576, 1675.

† De Variolis et Morbillis, p. 66, London, 1747.

‡ Phil. Trans. xlv. No. 493, 1749, p. 233.

§ Ibid. p. 235.

|| De Morbis Infantum Stockholmiae, 1764.

¶ Giornale di Medicina, Tome ii. 1764, p. 55.

** Historia Insitionis Variolarum in Suecia, 1767.

†† Rosenstein, Maladies des Enfans, chap. xii. p. 5, 18, Note.

‡‡ Observat. Medico-Chirurg., Obser. ix.

§§ Comment. Societatis Scientiar. Haarlem. T. x. 1768.

||| Edin. Med. and Surgical Journal, Vol. iii. p. 308.

unable to absorb the poisonous principle; and as the fœtus had not undergone the effects of that principle, and was consequently susceptible, the disease appeared in it within the usual period, and with its usual characters.

3. Cases have occurred in which a pregnant woman has been attacked by small-pox and gone through the different stages of the disease, while the fœtus, so far as could be trusted to external mark and other evidence, altogether escaped the disease. Of this class are the case seen by Boerhaave, and mentioned by Van Swieten,* on which he founded his opinion, one mentioned by Mauriceau,† three cases mentioned by Sir George Baker,‡ the case of the lady mentioned by Sir W. Watson,§ a case mentioned by Mr Kirkpatrick, || one case mentioned by Dr Smellie,¶ two cases mentioned by Baron Dimsdale,** two cases by Mr Roberts,†† three cases by Mr Jenner,‡‡ and four cases by Mr Kite. §§

This third class of cases presents for explanation a more serious difficulty than either of the two former. If in the first class of cases the variolous poison be transmitted by the circulation from the impregnated system of the mother to the foetus contained in the womb, and if, in the second, though it be prevented by extinguished susceptibility from evincing its effects on her, it be nevertheless capable of displaying its full energy on the fœtus, why should it not, in cases in which it produces manifest effects on the mother, also do the same in the fœtus? What are the circumstances, it must be asked, which prevent, in this class of cases, the developement of the action of the variolous poison in the contents of the womb? To this question various answers may be given. In the *first* place, it may happen that the disorder of the eruptive fever may cause so much disturbance in the functions and frame of the mother as to kill the child, or at least weaken it so much that death may take place before the variolous poison has time to exercise its effects; and this seems to have occurred in one of Mr Jenner's cases, one of Mr Roberts', and one of those by Mr Kite. In the *second* place,

* Van Swieten Comment. §. 1381, Vol. v. p. 8, 4to.

† Traité des Maladies des Femmes Grosses, &c. Obs. 576.

‡ Medical Transactions, Vol. ii. p. 314.

§ Phil. Trans. Vol. xlv. No. 493, p. 237, 1749.

|| Analysis of Inoculation, p. 21.

¶ Cases and Observations in Midwifery, Vol. ii. Collect. xviii. No. vii. Case 2. Lond. 1758 and 1768.

** Tracts on Inoculation, London, 1781, p. 129.

†† Medical Journal, Vol. v. p. 400. ‡‡ Ibid. Vol. vii. p. 165.

§§ Memoirs of Med. Society, Vol. iv. p. 309.

the disease may have affected the mother at a period of pregnancy so early that the variolous poison, though existing in her frame, does not readily affect the contents of the womb, and is expelled from the system before the fœtus is so far advanced as to be affected by it. This, it appears to me, is the explanation to be given of the case mentioned by Boerhaave, in which the attack took place in the sixth month, the case mentioned by Van Swieten (fourth month,) the cases of Mauriceau, Mr Thompson, (by Mr Kite,) and Mr Jenner, (in the fifth month,) and the last mentioned by Sir W. Watson, and the second case of Mr Kite. *Thirdly*, it may happen that the fœtus may be affected by the poison, yet die in the violence of the eruptive fever or the convulsions with which it is accompanied. *Fourthly*, it may happen that the fœtus may have the disease in a mild form, and which leaves no traces by which it can be distinguished. *Lastly*, it may happen that the fœtus is, from some unknown circumstance, unsusceptible of the infection, and may thus escape, while the mother passes through the disease.

It is evident, therefore, that the circumstance of the fœtus escaping while the mother labours under the disease, cannot be adduced as a proof that the poison is not transmissible from the mother to the fœtus. If we recount all the recorded cases we find that the numerical ratios are in favour of the disease being transmitted; and that, if we consider the circumstances under which it has not been transmitted, they appear to be rather exceptions depending upon peculiar causes.

To the question of susceptibility I have already briefly adverted; and stated that, according to the best researches, scarcely above 1 in 20 at the most, and perhaps not 1 in 400, escape the contagion of small-pox. Tissot was of opinion that only 4 or 5 among 100 are exempt from it; and Duvillard calculated that among 100 persons only 4 reached the age of thirty without being affected by the disease. This proportion may be diminished if we reflect on the fact, that some persons may have had the disease in the womb in a form so mild as to leave no traces of its appearance.

Susceptibility is impaired and sometimes destroyed by one attack of small-pox. It is more completely impaired, however, by an attack of confluent small-pox, than by an attack of the distinct and mild form of the disease, and more by an attack of the natural disease than the inoculated; and a person who has passed through the distinct form of the disease is still liable to be

affected with the confluent, or he may be attacked a second time with some form of the mild and distinct variety of the disease; and a person who has been inoculated with small-pox matter may be attacked by the natural disease, sometimes in a severe or even fatal form. The fact of these second or subsequent attacks of small-pox has been denied by several physicians; but it is established by the united testimony of Diemerbroeck, Cæsar Marescotti, Casimir Medicus,* Gatti,† Van Swieten,‡ De Haen,§ Servans van de Copello,|| Dryfhout,¶ Van Doeveren,** Aaskow,†† De Meza,‡‡ Sarcone,§§ Mosca,||| Targioni,¶¶ Juvenelli,*** Azzoguidi,††† Mumsen,‡‡‡ Aasheim,§§§ Withers,|||| Jenner,¶¶¶ Laird,**** Bateman,†††† Hennen,‡‡‡‡ Whitlock Nicholl,§§§§ Barnes,||||| and many other observers. It was further known by many that, even after inoculated small-pox, persons were not secure from an attack of the natural disease even in a very severe form. On the continent, however, where these facts were still remembered, it was allowed that the secondary disease was either not so well marked as the first, and constituted some of the forms of spurious small-pox, or the first was less strongly marked than the second attack, and was regarded as a less pure form of the disease. The knowledge of this important fact was either lost or overlooked at the period at which vaccination was introduced, and it was generally taught, among English physicians, that small-pox attacked the same individual only once in the course of life; and that its double occurrence in the same person was either very rare, or next to impossible. To

* Sendschreiben von der Ausrottung derer Kinderblattern. Leipzig, 1763.

† Reflexions sur les Prejuges qui s'opposent aux progres, &c. 1763.

‡ Commentaria. § Ratio Medendi, Pars ix. Viennæ, 1764.

|| Commentarii Societ. Scient. Haarlem. 1765, p. 209. ¶ Ibid. p. 260.

** Commentarii Societ. Scient. Haarlem. 1770, Vol. xii. p. 189, &c.

†† Collect. Societ. Med. Hafniens. Vol. ii. p. 91.

‡‡ Compendium Med. Pract. Fasc. i. Cap. xxi. p. 210.

§§ Istoria dèi mali Osservati in Napoli, i. p. 68.

||| Dissert. 2 sull Aria, p. 106. ¶¶ Avvisa sopra la salute umana, 1775

*** Avvisa, 1776. ††† Lettera sopra il Vajuolo.

‡‡‡ Acta Reg. Soc. Hafn. Vol. iii. p. 33. §§§ Ibid. Vol. iii. p. 327.

|||| Memoirs of Medical Society, Vol. iv. p. 186.

¶¶¶ A Continuation of Facts and Observations on the *Variolæ Vaccinæ*, London, 1800, p. 38.

**** Edinburgh Med. and Surg. Journ. Vol. iii. p. 156.

†††† Ibid. Vol. vi. p. 123. ‡‡‡‡ Ibid. Vol. xv. p. 155.

§§§§ Ibid. Vol. xvi. p. 154. ||||| Ibid. Vol. xix. p. 376.

this result nothing contributed so much as the paper of Dr Herberden on chicken-pox, since the publication of which in the Medical Transactions in 1772, the idea of such an occurrence, in defiance to authority so truly respectable, in the language of Dr Jenner, was generally relinquished. This error, which led to considerable misconception and confusion, was rather confirmed by Dr Willan, who, in 1806, was led, by circumstances now to be noticed, to apply to the diagnosis of chicken-pox and small-pox, the accurate nomenclature which he was then introducing.

Subsequent to the introduction of vaccination, many examples of eruptions, presenting the characters of small-pox, occurred, notwithstanding the representations of Jenner and his friends, in the persons of those who had been vaccinated. Of these some were admitted to be examples of small-pox in a modified form; while others, though at first taken by some as genuine small-pox, were afterwards considered as examples of chicken-pox. This view was taken chiefly for the purpose of maintaining the credit of vaccination as an antivariolous agent; and as great importance was attached to this mode of explaining their appearance, and as it was believed that the peculiar characters of chicken-pox were still imperfectly known, Dr Willan undertook to deliver a correct history of the phenomena and progress of chicken-pox and small-pox occurring after vaccination, and to fix the respective diagnostic marks of each with more precision than had hitherto been done.

It will be afterwards seen that the sufficiency of the diagnostic marks assigned by Dr Willan was questioned by Dr Thomson, in consequence of the phenomena afforded by a small-pox epidemic, which began in 1815, and continued to the close of 1818. For the detailed results I must refer to the work of that author, and to the contemporaneous writings of Mr Cross and Dr Barnes in England, Hodenpyl in Holland, Berard and Delaviv, Fontaneille and Bousquet in France, Luders and Mohl in Sweden, and the recent sketch of the Ceylon epidemic by Dr Kinnis. It is sufficient here to state shortly a few leading conclusions, deduced partly from these researches, partly from personal observation.

1. Small-pox, though in general attacking the same individual once only during the course of life, may, however, affect him a second and even a third time.

2. This happens much more commonly when the first attack

has been one of mild distinct small-pox, than when it has been severe ; and if the first attack have been one of confluent small-pox, it is rare for the same individual to have a second attack.

3. It is established by numerous observations, that an attack of any one of the varieties which have been named spurious small-pox or chicken-pox, by no means secures the same individual from an attack of confluent small-pox at a subsequent period.

4. Small-pox produced by inoculation does not necessarily secure the individual against an attack of small-pox induced in the natural way.

5. Every previous attack, however, of small-pox, whether natural or inoculated, exercises some modification on that which succeeds. This modification may be various in degree, from very slight and almost imperceptible, to very conspicuous and remarkable. In this modification, the symptoms of eruptive fever may be mild and of short duration ; the eruption may appear on the third day ; and the eruption may consist of vesicles or hard pustules, which disappear without suppuration.

6. The most powerful modifying agent of small-pox is cow-pock, or the disease produced by the application of vaccine lymph to the exposed skin, the previous application of which, in a large portion of cases, not only renders the individual less likely to be affected by the variolous effluvia, but if he is affected, changes very much the characters of the disease which it produces. Though the fever which precedes the eruption, in cases of this class, be similar in form and equal in degree to that by which the inoculated small-pox are attended, the eruption is either papuliform or tuberculated, without much surrounding inflammation. A similar eruption is produced when vaccine and variolous matter are inoculated at the same time in the same individual ; or when a person who is exposed to the variolous contagion has been inoculated with vaccine lymph early enough to mitigate, but not wholly supersede, the eruption of small-pox. In such circumstances, the vaccine lymph and variolous matter restrain and counteract the operation of each other on the system and on the skin. To these eruptions of modified small-pox the general name of *varioloid* eruptions has been applied.

7. Cow-pock destroys the susceptibility to inoculated small-pox almost entirely ; but the susceptibility to the natural disease, or that by inhalation, it does not entirely extinguish.

This susceptibility, however, it diminishes in a much greater degree and much more effectually than inoculated small-pox does.

8. The susceptibility to second attacks of small-pox, and attacks of small-pox after vaccination, is principally favoured by the existence of an epidemic constitution of the atmosphere, and by the circumstance of early life, or the age below ten years. If no epidemical constitution take place, the occurrence of second or iterated attacks of the disease may not be observed for a long series of years. But if, on the other hand, the atmosphere possess or acquire an epidemic or variolous constitution, then neither the circumstance of a previous attack of small-pox, nor vaccination, can insure many of those under ten years of age, and not a few between that and thirty, from attacks of small-pox.

§. VI. MORTALITY OF SMALL-POX, AND CIRCUMSTANCES BY WHICH IT IS INFLUENCED.—The mortality occasioned by natural small-pox has varied in different places. In London, previous to the introduction of vaccination, it appears from the observations of Dr Heberden to have ranged from $8\frac{1}{2}$ to 9 per cent.; whereas at Geneva, from the close of the sixteenth to the middle of the eighteenth century, it was about 5.7 only. But the accuracy of this statement of the mortality of small-pox in London has been questioned by Dr Watt, who found the mortality in Glasgow by the same disease to be 18.82 per cent. at an average between 1783 and 1800.* It appears to me to be extraordinary that the accuracy of the statements and deductions of Dr Watt was doubted; for if we examine the statements of the mortality by small-pox in different places as given by different authors, we find that these make a much nearer approach to the estimate of Dr Watt than to that of Dr Heberden. Dr Nettleton showed, that, in eleven towns in Yorkshire, nearly 1 in 5, or 19 per cent. died of natural small-pox; and Dr Jurin found that, at an average, the mortality was somewhat more than 18 per cent., and 1 in 14, or more than 7 per cent. of all the births. (Phil. Trans. Vol. xxxii. p. 224.) From a calculation made by Dr Haygarth from the observations of Dr Price and Baron Dimsdale, for ten years, from 1759 to 1768, small-pox appears to have been fatal to 1 in $6\frac{1}{4}$ of all who are born in London,† which is equi-

* Treatise on the History, Nature, and Treatment of Chincough. 8vo, Lond. 1813.

† Sketch of a Plan, p. 139.

valent to 16 per cent. In Manchester, during the six years from 1769 to 1774, inclusive, according to accurate lists collected by Dr Percival, of 3807 deaths by all diseases, 589 were by small-pox,—which gives 1 in $6\frac{1}{2}$, or rather more than 15 per cent.* During the three years 1772, 1773, 1774, among 3634 burials at Liverpool, the deaths by small-pox, according to Dr Dobson, were 662, which is rather more than 18 per cent.† The mortality at Salzwedel in the ten years from 1765 to 1774 amounted to 17.85 per cent.; and in 140 villages in Germany during the same period, it amounted to 15.13 per cent. There is great reason to believe, therefore, that all the statements which make the rate of mortality by small-pox much lower than this are founded on erroneous or insufficient data.

Of this mortality, the greatest part takes place in children below ten years of age, among whom it is computed that one-half of all the deaths are caused by small-pox. (Haygarth as to Chester.) From all the authorities, too, it results that a very large mortality by natural small-pox takes place in the unprotected during the second year of life, (Dobson and Percival,) and onward to the fifth year. From the tables kept at Chester from 1772 to 1777 inclusive, it results, that nearly the same mortality took place between the ages of one and two, two and three, and three and five, and that between five and ten it did not exceed two-fifths of the mortality of each of the previous periods. It must at the same time be observed, that this diminution between the fifth and tenth year depends upon local causes, since few of the natives of Chester above seven years old had not been exposed to the variolous contagion.

The mortality of inoculated small-pox varies at different periods, and under different circumstances. According to the calculations of Dr Jurin, it was estimated that in indiscriminate inoculations of persons of all kinds of constitution, there die 1 in 60, and in inoculations conducted with selection and caution, there die 1 in 91.‡ In America, again, Tennent lost only one infant in 438 persons; and, according to the reports of the London Small-pox Hospital, after the practice had been in use for eighty years and was conducted with every precaution, 399 among 400 inoculated persons recovered, or, in other words,

* Medical Observations and Inquiries, Vol. v. p. 272; and Essays Medical and Experimental, Lond. 1767, Vol. ii.

† Sketch of a Plan, p. 140. ‡ Phil. Trans. xxxii. p. 209 and 213, No. 374.

only 1 in 400 died. * It is impracticable, however, to estimate this ratio with accuracy, since in epidemic seasons even inoculated small-pox may be attended with danger. An important fact, which Dr Heberden has clearly established from the London Bills of Mortality, is, that the mortality from natural small-pox was rather increased than diminished by the practice of inoculation. From comparing the number of deaths ascribed to small-pox during the first thirty years of the eighteenth century, with the number ascribed to the same disease during the same number of years at the close of the century, it appears that an increase had taken place in the proportion of from 7.4 per cent, to 9.5 per cent. or fully 2 per cent. This it is easy to understand. As inoculation maintains a constant source of infection, and taints the atmosphere of the locality in which it is carried on, it does not diminish, but rather increases the liability of the susceptible to the disease. The practice of inoculating small-pox was, in short, advantageous to the individuals inoculated, but most injurious to the community.

With vaccination it is altogether different. According to the most authentic and accurate returns, it appears that its effect has been to reduce the mortality of small-pox from $19\frac{1}{2}$ per cent. to between 3 and 4 *per cent.* in this country, where it is not enjoined by law, and where, consequently, small-pox is still allowed to prevail. In London it appears still to be a little above 5 *per cent.*† In other European countries, where the performance of vaccination is directed by legislative enactments, its effect is still more conspicuous. Prussia seems to be the country best adapted for demonstrating the ameliorating influence of this agent. During the ten years previous to 1823, while the number of deaths by small-pox, previous to the practice of vaccination, had been estimated at 83 per 1000, or more than 8 per cent. it fell to 9 per 1000, so that it appears that, by this means alone, 74 lives in every 1000 born were preserved.‡

Upon the time at which small-pox most readily proves fatal, some light is thrown by the facts elicited in the recent re-

* Observations on the increase and decrease of different diseases, Lond. 1801.

† Blane's Select Dissertation Tables, at p. 357, 5. 3.

‡ Casper Beitrage zur Medizinischer Statistik und Staatsarzneikunde, &c. s. w. Berlin, 1825.

port of Dr Kinnis in the Ceylon epidemic. From a tabular view of the days in which 107 cases of small-pox terminated fatally, it appears that more than one-half died during the second week, or between the seventh and fifteenth days; less than one-fourth of the whole died during the first week; and rather more than one-seventh died during the third week.

§. VII.—DIAGNOSIS. It might be imagined that it would be easy to distinguish small-pox from any other disease. But it has been supposed that it might be confounded with petechial eruptions, blebs (*bullæ*,) measles, and chicken-pox; and secondary pustular eruptions from the absorption of the syphilitic poison, and the long or repeated use of mercury, have been sometimes mistaken for it.

1. From petechial spots, the variolous eruption is to be distinguished by the nature of the concomitant fever, by the character of the eruption, and by the absence of any tendency to suppuration.

2. Large watery blebs are not uncommon in malignant confluent small-pox, especially in that kind described by Sagar in the epidemic of Iglau, in Moravia. But these it will be impossible to mistake for the common blebs, if attention be paid to the appearance of the rest of the skin, and the nature of the prevalent epidemic.

3. Small-pox may be distinguished from measles, by the form and progressive changes in the eruption, and the concomitant symptoms. In measles the eruption appears in crescent like patches, and terminates in desquamation, in the course of the fourth day. In small-pox, though the eruption may appear at first in spots or efflorescent patches, these form vesicles or pustules, or blebs, and proceed either to suppuration, or blacken on the eighth or ninth day. In small-pox also the process is accompanied with secondary fever.

4. It is not easy to distinguish some of the varieties of small-pox, or those designated as varioloid, from chicken-pox; and the difficulty has been rather increased by the experience furnished by the recent epidemics. The chief differences consist in the eruption of the chicken-pox presenting more frequently and more completely a vesicular character, with little or no tendency to suppuration, in its running its course in a shorter time, that is to say, in enduring only five or six, instead of eight or ten days, and in the symptomatic fever being also milder and shorter in duration.

5. In the persons of those who have been exposed to the syphilitic poison, and in whom it has begun to produce secondary effects, and also in those to whom mercury, in repeated and long continued courses, has been administered, it is not uncommon to find, after an attack of fever with anxiety and difficult respiration, an eruption of bodies, first papular and vesicular, and then pustular, over the face and extremities, and in a smaller degree over the person. The appearance of these pustules is very similar to that of distinct small-pox; but they are more tedious and irregular in their course, and they give rise to a greater degree of irritation. They are to be distinguished from small-pox by the history of the case, by their occurrence independent of any epidemic, by their deep red or copper colour, and by their longer duration. This is one of the eruptions called pox or *verole*, and in contradistinction to which *variola* was named small-pox.

§. VIII.—TREATMENT. The duty of the physician in the management of small-pox is of two kinds; preventive, anticipating or prophylactic, and curative or remedial.

The preventive management of small-pox consists either in the artificial production of the disease by inoculation; or in the employment of the antivariolous power of cow-pox artificially induced. Of the latter as a means of preventing small-pox, or divesting it of most of its severe and dangerous characters, I have already spoken under the head of cow-pox. Here, therefore, I have merely to speak of the practice of artificial variolation, or inoculation, as it is named.

This operation consists in the application of small-pox matter to the surface of the corion, exposed by puncture or incision, so as to produce, *first*, local inflammation similar to small-pox, and *secondly*, a constitutional affection attended with an eruption of small-pox, in general in a milder form than the disease presents under the ordinary circumstances of atmospheric infection. On the second day, the part when examined with a good glass presents a minute orange-red spot not unlike a flea-bite; on the third, the spots are enlarged, and may be the size of a lentil; and on the fourth day, when the patient feels an inconvenient pricking, it is slightly inflamed, and is the seat of a lenticular or seedy hardness, which inspection by a glass will show to be derived from a minute vesicle filled with a clear fluid surmounting an inflamed base, the part resembling a scald or superficial burn. These characters are more obvious

on the fifth day. On the sixth, the patient feels stiffness of the arm-pit with dull pain, which is rendered more severe by motion; while the red spot of the puncture becomes white in the centre, which appears depressed; its circumference becomes red and more extensive; and the whole forms a phlegmonous or inflamed knot. On the seventh day these signs are still more distinct; and in general about the conclusion of this day, the symptoms of fever or constitutional disorder begin to appear in the form of slight remitting pains of the head and back, and proper variolous fetor of the mouth, succeeded by transient shiverings and alternate heats. These phenomena constitute the first, primary or incipient stage of the process, and represent the latent or incubating period in inoculated small-pox. It is never shorter than five days, and the eruption may appear at any time between the fifth or sixth day, and the fourteenth,—according to some so late as the seventeenth, or even the twenty-third day. But these are rare instances. A person remaining without symptoms of fever after the twenty-third day may be presumed not to have been infected by the inoculated virus. It is further to be observed, that the duration of the latent period in inoculated small-pox is much influenced by the climate, and perhaps by the season. In Italy the eruptive fever generally appeared on the fifth or the sixth day at the latest, and in Vienna it appeared about the same time in those who were inoculated in the spring, and at the approach of summer. In Geneva also, the eruptive fever appears in general on the fifth day after inoculation. In colder regions, however, it appears more tardily.

After the first appearance of febrile symptoms, the inflammation in the arm spreads rapidly; and when inspected by a good glass, the puncture appears surrounded with many small confluent pustules, which increase in size and extent as the disease advances. On the tenth or eleventh day is usually observed surrounding the puncture, and extending sometimes half round the arm, but more frequently nearly to the size of a shilling, a circular or elliptical redness of the skin, smooth to the touch and not painful. This appearance which accompanies eruption is regarded as favourable. The pains in the back and limbs disappear; the pains and stiffness in the arm-pit subside; and after some pricking or itching on the skin, variolous pustules appear in the face, neck, and various parts of the body.

In some instances, before the eruption of the genuine variolous pustules, on the second day of the eruptive fever, the seventh or ninth of the inoculation, there appears on the arms, breast, and face, a red efflorescence, having the characters of the rose-rash (*Roseola Variolosa*;) and on the following day, it spreads over the trunk and extremities. On the second or third day of the efflorescence, distinct variolous pustules containing a little fluid may be distinguished amidst the general redness, by their surrounding elevations, by their hardness, and by the whiteness of their summits. The rash then begins to decline, and on the fourth day traces of it can rarely be discerned. (Willan, Kite, Memoirs Med. Society, Vol. iv.)

The variolous rose-rash appears in about one case among fifteen in the inoculated small-pox, and used to be accounted the indication of a small and favourable eruption. It takes place principally in persons in whom the stomach is delicate, and the skin irritable. It appears to have been very frequent in the practice of the correspondents of the first Dr Monro.*

The extension of the local inflammation and the appearance of the minute pustules denote the commencement of the second stage of the process, or that at which the variolous matter begins to reproduce itself. It is analogous to, if not the same, as the eruptive stage of the natural disease, unless that the febrile symptoms are less violent and of shorter duration, and are generally attended with a moderate eruption of distinct small-pox. The fever is generally so mild as not to require confinement. In other instances, however, inoculation has been succeeded by severe constitutional symptoms, and ultimately with an eruption of confluent small-pox.†

The principal advantage, however, expected from the artificial mode of communicating the disease, certainly consists in obtaining, in general, the distinct or mild form of the eruption, and in preventing or moderating the secondary fever of confluent small-pox, which is at all times dangerous, and not unfrequently fatal.

Among the early inoculators who succeeded Maitland, as Nettleton, Jurin, Mead, Thompson of Philadelphia, and some others, great stress was laid on what was termed the preparation, which consisted in subjecting the individual to be inocu-

* Account of the Inoculation of Small-Pox in Scotland, Edin. 1765. p. 44.

† The History of the Small-Pox, by James Moore, p. 275.

lated, to a long and rigorous course of previous treatment by regimen and medicine, lasting in most instances for several weeks. In addition to due regard to the selection of a proper subject, whose age, habit, constitution, and temperament were ascertained according to precise rules, several precautions were enjoined with regard to his diet, his exercise, and entire general management, and he was directed to take at stated times, certain doses of mercurial and antimonial or other medicines, believed to produce a depurating effect. The first innovations upon the rules of this system were made in 1760, by Gatti, Professor of Medicine at Pisa, who, having learned the practice of inoculation in the east, simplified the process greatly by entirely rejecting preparation, and operating chiefly on persons in perfect health. It is also said, that he selected the matter from pustules not entirely ripe, and was the first who used the matter of inoculated, instead of the natural, small-pox to propagate the disease; circumstances to which, perhaps, is to be ascribed the mistake committed in the case of the Duchess of Boufflers, and many other persons in whom a variolous eruption appeared at a period so long posterior as to give rise to the belief, that they had undergone the disease twice.*

About the same time, Daniel Sutton, among other improvements, abridged the period of preparation from a month or six weeks to eight days,† but continued to administer, both during the preparatory and inoculating stages, various secret remedies, which are now known to have consisted chiefly of calomel and tartar emetic. Sir George Baker, who first disclosed the method of Sutton, considered with much attention the reasons of the method of preparation, and the comparative merits of the heating and cooling method of treatment, and gave a therapeutic system, which formed the basis of all the modern improvements.‡ Dr Dimsdale, who flourished about the same time, and was afterwards employed to inoculate the Imperial family of Russia, and to introduce the practice into the Russian Empire, did not scorn to imitate the method of Sutton, simplified the preparatory treatment, and diminished the exceptions prescribed as to constitution, habit, and other peculiarities.§

* *Reflexions sur les prejuges qui s'opposent aux progres et à la perfection de l'Inoculation, par Mr Gatti, a Paris, 1764.*

† *Inquiries into the merits of a Method of Inoculation, second edition, London, 1766.*

‡ *Medical Transactions, Vol. ii. p. 275, London, 1777.*

§ *On the Inoculation of Small-Pox, London, 1769-1779, &c.*

The measures and precautions which were, in this improved state of the practice, thought requisite to insure a favourable issue, were digested by Cullen and Borsieri into the form of a body of rules, which, with a little modification, were in general use so long as the practice was employed. The following may be regarded as the most essential circumstances demanding attention.

1. Inoculation should be performed principally, if not exclusively, in persons free from actual disease, and not liable from age or other causes to incidental complaints.

It is important to select persons not labouring under any cutaneous disease, under catarrh, or peripneumony, diarrhoea, or dysentery, or any affection of the mucous membranes, because such affections might be aggravated by the application of the variolous *virus*. Means should be previously taken to remove or at least to mitigate these complaints. Borsieri recommends that persons should be selected who are free from strumous, venereal, or scorbutic taint.* But Cullen remarks, that he found that inoculated small-pox was not worse in strumous than in other habits, and that even several cutaneous diseases are in this respect blameless. The chief difficulty in this case is the fact, that variolous inoculation does not readily affect persons labouring under cutaneous disorders. It must be observed, nevertheless, that Dr Quier found neither venereal complaints, nor yaws, nor any cutaneous disease, any impediment to inoculation in Jamaica. In other respects, a remarkable advantage over inoculation is possessed by vaccination in the circumstance, that it is calculated for the strumous and the delicate, as well as the healthy and robust.

2. The second condition is to select the time of life most favourable to the production of a mild variety of the disease.

Though inoculation has been practised with safety on persons of all ages, yet experience shows that adults, especially if plethoric, are more liable to a violent form of the disorder, than young persons in whom the activity of the circulation and secretions has a tendency to obviate *plethora*. Experience also shows that pregnancy, especially if far advanced, probably by its plethoric character, is also unfavourable; and another evil is the chance of affecting the fœtus. To this may be added the puerperal state, which, for obvious reasons, contraindicates the

* Institution, Med. Pract. cclxxxviii.

adoption of the measure. It is further known, that in infants before the time of dentition, the irritability of the nervous system is so great, that the variolous contagion is apt to induce epileptic fits or some affection of the brain; and Dr George Fordyce states, that, of the children who have died in London after inoculation for a long series of years, so far as he had been able to collect, more than two-thirds had been under nine months.* During the first dentition this irritability is not diminished, sometimes it is augmented; and it is ascertained by all observation, that at this period the natural small-pox is particularly fatal. For these reasons, Percival recommended that the fittest time for inoculating children was between the age of two and four in the case of healthy children, and between three and six in the delicate. Borsieri again placed the most eligible period, any time between the fifth and the tenth or even the twelfth years. Percival, with the view of averting the danger of natural small-pox, which is very great in towns, thought that the inoculation of healthy and vigorous children at the age of two or three months was advisable, especially in large towns;† and this view was favoured by the authority of Cullen. Of this, however, the experience of Dr Fordyce, already stated with regard to London, furnishes a very strong prohibition.

3. Inoculation should be performed at a favourable season, if possible.

Spring or the beginning of summer has been on all hands allowed to be the most eligible season for inoculation. It was imagined that the cold of winter and the intense heat of summer, which aggravate the symptoms of natural small-pox, might also be injurious to the inoculated disease. Experience, however, showed that on this point there were few grounds for apprehension. Patients under the process of inoculation have done as well in cold seasons and in summer, as in temperate weather;‡ and it does not appear that inoculation was more severe or tedious, or attended with greater danger in the East, where it was first practised, and in the West Indies, where it was practised

* Transactions of a Society, Vol. i. p. 10.

† Medical Observations and Inquiries, v. p. 281.

‡ "I have good information," says Dr Monro, "of 112 people being inoculated in the middle of winter, in one of our most northern isles, where there was scarce fuel enough to prepare victuals, and many of the inoculated went abroad bare-footed in snow and ice; and yet not one of the whole number died."—An account of the Inoculation of Small-Pox in Scotland, Edinburgh, 1765, p. 12.

by Dr Quier, than in other countries which are less warm. According to the observations of Dimsdale, inoculated persons have generally presented more pustules in spring than at any other season of the year; and the only exceptionable season is autumn, which the frequency of sore throats, intestinal disorders, and dysenteric complaints renders inexpedient. On the contrary, if proper care be taken to admit abundance of cool fresh air, summer is as favourable a season as any for inoculation; and the statement of Dr Monro, *primus*, already referred to, shows that many have been inoculated in the depth of winter without sustaining any injury.

4. A fourth condition necessary to successful inoculation was believed to be preparation of the person, by enjoining abstinence from improper food for some time before inoculation.

The principal use of the precaution is to diminish the plethoric and inflammatory state of the system. As small-pox is generally severe in proportion to the intensity of its febrile and inflammatory symptoms, the most likely method of obviating the severity of these symptoms is by diminishing or withdrawing the allowance of animal food, and restricting the patient to vegetable diet. Dimsdale ceased for many years to enjoin any restriction in diet. Cullen imagined the time for this restriction might be abridged; but, in the opinion of Dr Fordyce, who ridiculed all other means of preparation, the vegetable diet was the most useful part of the whole system. (Transactions of a Society, Vol. i. p. 10.)

5. It is important to clear the bowels and rectify the circulation and secretions of the alimentary canal, not only by the use of unstimulating diet, but by the administration of a few doses of purgative medicine.

In the preparation practised by the Suttons, the use of mercurial and antimonial medicines for some time performed a most important part; and most of the contemporaneous and succeeding physicians, in imitation of a practice which bore the appearance of success, prescribed calomel and chalk with sulphuret of antimony, or kermes mineral, antimonial powder, or tartar emetic, more or less freely. There is little doubt that the exhibition of mercurial and antimonial medicines was in many cases carried to an injurious extreme, and was in all quite unnecessary. Dr Gale of Connecticut, after observing the practice of giving mercury and antimony in preparing persons for

inoculation, and losing one patient in 100, gave up the practice, and lost only one patient in 800.* For this reason, the propriety of administering these medicines was questioned by Sir George Baker and Dr Dimsdale, who, in the latter period of his practice, relinquished entirely their exhibition before inoculation to those who were in proper health, with the exception of a single dose of calomel and sulphuret of antimony the previous evening. Camper in like manner informs us, that he never fatigued his patients by this preliminary treatment; yet all of them underwent small-pox without any unfavourable accident; and the physicians who followed his method had the same success. Dr George Fordyce states, that he has had frequent opportunities in St Thomas's Hospital of seeing persons using mercurial and antimonial medicines, and observing restrained regimen, attacked with small-pox, which were in no respect more favourable than in others who were not under such treatment.† Lastly, Pinel states it as the result of his experience, that preparation and its ceremonies are frivolous and unnecessary.

The only manner in which the mercurial and antimonial medicines can be useful is in their operation on the intestinal canal, and on the skin; and as there can be nothing specific in this, there is no reason why ordinary cathartics may not be employed. If calomel be used, it should be conjoined with rhubarb or jalap; and a full dose of the compound jalap powder, or the saline infusion of senna, will answer the purpose equally well.

6. It is farther conceived to be important to avoid intemperance, exposure to cold, or humidity, or excessive heat, or violent mental emotions, which may concur with the application of the virus to aggravate the subsequent disease.

7. It is important to avoid much external heat, and consequently to keep the patient lightly clothed, in a cool chamber or even in the open air, as much as possible, and to prevent him from being too much in bed. The efficacy of this measure is demonstrated by the practice of the Suttons.

8. It was believed to be an important condition to the successful result of inoculation to choose fit matter, by taking it from a person of sound constitution, equally free from actual

* An Inquiry into the merits of a Method of Inoculation, by George Baker, second edition, p. 24, London, 1766.

† Transactions of a Society, Vol. i. p. 16.

and suspected disease, and from one who has had the small-pox of the most benignant kind ; by taking it as soon as it has appeared on the pustules ; and lastly, by introducing but a small portion at the inoculating puncture.

However rational these principles may appear in speculation, they have been modified by experience. It is ascertained, in the *first* place, that matter taken from the benign distinct small-pox may produce the confluent form of the disease ; and conversely, that the effluvia of the confluent form has often produced the mild distinct disease. Fordyce among others observes, that it is not of the smallest consequence to the future event, whether the matter be of the mild or confluent kind. In short, as it is well known that the same contagion will produce the natural disease in one person of the mild, and in another of the confluent kind, it must be inferred, that much more depends on the constitution of the individual than on the nature of the matter. In the *second* place, though Gatti and the Suttons employed for inoculation, the fluid as soon as it had appeared, and before suppuration, there is reason to believe, that this has been one cause why the inoculated variolous virus often produced no pustular eruption, as happened in the case of the Duchess of Boufflers, and in the cases recorded by Mr Dawson, (Medical Transactions, Vol. iii. p. 380.) and Mr Kite, (Memoirs of Medical Society, Vol. iv. p. 114, &c.)

In the *third* place, as to the quantity of matter required to be applied, and the number of punctures, an important fact was ascertained by Dr George Fordyce, illustrating not only the influence exercised on the constitution, but the modifying influence which variolation produces on itself. Dr Fordyce found that when variolous matter is applied by two or three punctures at once, it produces much local irritation and inflammation, and, after the usual fever, a crop of pustules more or less numerous ; that when variolous matter is applied by a single puncture, it produces a less degree of local irritation and inflammation, and after the usual fever a crop of pustules sufficiently numerous to demonstrate the action of the disease ; and that when variolous matter is applied by a single puncture, and after the interval of two days variolous matter is inserted on the third by a second puncture, the latter produces a little local irritation, but no general fever, nor any increase in the number or extent

of the eruption. From this fact he drew the inference, that variolous matter, after the first twenty-four hours from the time when it is received into the vessels, loses all power of producing fever, and that the first inoculation, if efficient, renders the system callous or insensible to the second. He found also that, in cases in which one puncture had been made, or only one had suppurated, the small-pox were more favourable than when three had been made, and all had suppurated, and that the insertion of variolous matter by a single small puncture was quite as effectual and more mild in communicating the disease, than where it was applied by incisions or large punctures. (Transactions of a Society, Vol. i. p. 1.)

The important deduction established by these experiments is the fact, that after variolous matter has been applied to an absorbing surface, and is producing its legitimate effects, no fresh application of variolous matter has any additional effect. The first operates upon the system so completely as to render the second comparatively inert, and, in short, to modify or subdue, if not neutralize, its action.

These facts are further in accordance with the doctrine of the influence and operation of morbid poisons. Although, therefore, it be not proved that the violence of the disease is proportionate to the quantity of matter applied, it is obvious that it is superfluous to apply more than is necessary to the production of the effect.

The treatment after inoculation during the process which succeeds is very simple.

1. The feverish symptoms are for the most part so mild as seldom to require any assistance except such management of the alimentary canal, by means of proper light unstimulating food, and such doses of laxative medicine, as may insure the regular evacuation of the bowels. The propriety of continuing light and digestible diet is obvious. The saccharine and farinaceous vegetables, without animal matter, except milk or whey, furnish food which is sufficiently nutritious, without overloading the stomach or impeding circulation and secretion.

2. An occasional dose of mild laxative medicine may be required to prevent constipation or the retention of improper secretions. To this effect the calomel and sulphuret of antimony of the older inoculators were supposed to contribute. But there is little doubt that the same effects are produced with greater certainty, uniformity, and safety, by the seasonable administra-

tion of proper laxatives. The aloetic or compound colocynth pill, the compound jalap powder, infusion of senna, with or without cream of tartar or sulphate of magnesia, or five grains of calomel, with twelve of jalap powder, or even an ordinary glyster, may be advantageously employed at this period, according to the effects produced.

3. It is of the utmost moment to observe in all respects the cooling regimen. Light clothing, a cool well-aired apartment, even keeping as much as possible in the open air, and the use of cool aqueous acidulous liquors and ptisans, all contribute to carry the patient through the process without unfavourable symptoms. On this point, the evidence of Dr Monro as to the management in Scotland, and Sir George Baker as to that in England, are quite conclusive.*

It is proper to mention, that the puncture should either not be dressed, or covered in the lightest and coolest manner.

I have thus treated of the most improved and rational manner of conducting the process of inoculation, not from the necessity of the subject, but because it involves several important facts in the physiological and pathological history of small-pox, of which no intelligent physician should be ignorant. It is almost unnecessary to say that the practice and the rules for conducting it have become useless, in consequence of the superior advantages of vaccination. A more formidable objection to its employment is found in the fact, that, wherever the practice is continued, it propagates and maintains a source of variolous infection, which tends to diffuse the natural disease among the susceptible and unprotected members of the community. This is illustrated not only in the large towns in this country, as London, Manchester, Liverpool, Edinburgh, and Glasgow, but in the greater part of India, where the native inoculators still persist in communicating small-pox to their countrymen.

CURATIVE TREATMENT.—After the general introduction of the practice of vaccination, it was fondly hoped that we should study the history and nature of small-pox only as an object of curiosity, and that we should no longer have occasion to give attention to its treatment. These philanthropic wishes have not been realized; and, from various causes, the practitioner is still occasionally summoned to prescribe for cases of natural small-pox, both distinct and confluent. It is, therefore, incumbent on me to

* See the influence of the different modes of treatment, as illustrated by the case of Blandford, detailed by Sir George Baker, lib. cit. p. 57.

enumerate the therapeutic rules which the experience of the most skilful practitioners has shown to be best calculated for conducting the treatment of natural small-pox, so as to insure a favourable issue.

The treatment of natural small-pox has given rise to some difference of opinion among physicians. Though there are not wanting instances, among the older physicians, of the treatment of this disease by blood-letting and other evacuations, yet the majority of practitioners, both on the continent and in this country, conceiving it to be the effect of a pestilential poison, attempted to cure it, and counteract its symptoms by the administration of heating cordials, alexipharmics, and stimulants, by keeping the patient in a chamber well heated by a fire, covered by a load of bed-clothes, and carefully excluding fresh air, and by the regular exhibition of warm stimulating liquors. In this method it seems to have been forgotten that, admitting the disease to be caused by a pestilential poison, that poison gives rise to highly inflammatory symptoms in various important organs. The pernicious effects of this mode of management were first suspected and then demonstrated by Sydenham, during the latter half of the seventeenth century; and though his method was warmly opposed by Morton and Gideon Harvey, it was adopted by Boerhaave, and several of its essential principles were defended and practised by Dover, Berger, Freind, and Mead. In one respect only, namely, the administration of opiates in the inflammatory stage, was the practice of Sydenham improper; and this mistake Tissot afterwards rectified in a clear and forcible manner.

While the profession were still divided about the merits of the hot and stimulating, and those of the cooling and evacuating method of treating natural small-pox, the experience furnished by the introduction of inoculation contributed powerfully to demonstrate the advantages of the latter, which were eventually placed in a clear light by the precepts of Frewen, the practice of M. Gatti and the two Suttons, and the facts and arguments of Sir George Baker, Dr Glass, Dr Dimsdale, Tissot, Tralles, and Van Swieten. The beneficial effects of this mode of treatment have been so amply and indisputably confirmed by subsequent experience, that whatever modifications particular epidemics and cases may require, no doubt can be entertained that the general therapeutic principles ought to partake chiefly of refrigerant and antiphlogistic measures.

The application of the particular measures will perhaps be most easily understood by distinguishing them into those required by the individual stages of fever, eruption, suppuration, and desiccation.

It rarely happens that the physician is summoned at the very onset of an attack of small-pox ; and if his advice be then requested, as the disease presents only the usual symptoms of inflammatory fever (*synocha*,) with more or less intensity in some particular organ, his treatment must be directed chiefly to moderate the intensity of these symptoms, without reference to the probable peculiar character which the fever may afterwards assume.

If, however, he has reason to believe, from the prevalence of small-pox as an epidemic, and from any of the symptoms presented by the patient, that the disease, for which his aid is requested, is an attack of small-pox, the first object is to moderate the violence of the febrile symptoms by the adoption of as much of the antiphlogistic regimen as the case admits. The patient should be freely exposed to cool air, and should either be kept out of bed during the day, or covered only very lightly with bed-clothes ; the surface of the body should be sponged several times daily with tepid water, or even the cold affusion may be used ; and cooling diluent acidulous liquors only should be allowed, while solid food and animal soups are entirely withheld.

Where sickness and vomiting are urgent, an emetic of one scruple of ipecacuan at the commencement will be useful ; but some physicians conceive that medicines of this class may aggravate the gastric symptoms. In general the administration of the emetic should be confined to the early period of the febrile stage. If the sickness be accompanied with much pain of the stomach, the most effectual remedy is a full bleeding, and an effectual dose of cathartic medicine.

In every case of suspected small-pox it is proper to shave the hairy scalp, both for the purpose of the more effectual application of cold to the head, and in order to diminish or obviate the irritation which the pustules on that part of the skin may cause on their suppuration.

The stupor and drowsiness which attend the eruptive fever disappear as the eruption comes out, and seldom require active measures. But it is proper to apply cold to the head, and immerse the feet in warm water, or, in the case of children, to use the tepid bath ; and purgative medicine in effectual doses, or

glysters to evacuate the bowels are beneficial. When convulsions take place, as is not uncommon in infants, it is conceived that they are dangerous, principally when they occur early, are violent, or recur repeatedly; and in that case Cullen, influenced apparently by the example of Sydenham, was of opinion that blood-letting was of no service, and represented the only effectual remedy to be a large opiate. Of this measure I feel it requisite to disapprove, and to say not only that opiates are here injurious, but that the best and most effectual remedy is blood-letting from the arm in the case of children from 5 to 10 or 12, to the extent of eight or ten ounces; and in the case of younger persons, either a general bleeding to the extent of five ounces, or local bleeding by means of leeches applied to the temples or the occipital region. This will be not less clearly indicated if there be much *delirium*, violent screaming, intolerance of light and sound, or heat of the head and face, or, in short, symptoms indicating the presence of meningeal congestion or inflammation. In the case of persons above the age of puberty, and adults generally, the same measure is required by the presence of headach, *delirium*, much stupor, or *typhomania*, in each or all of which eighteen or twenty ounces of blood may be taken from the arm with great benefit.

The eruptive fever is always attended with more or less rapid, difficult, and panting respiration, with anxiety in the chest, all of which disappear, or at least are abated upon the establishment of the eruption. But if these symptoms be very urgent, blood-letting from the system is also indicated, and should be carried to the same extent as already specified, with reference to the age and strength of the individual. These symptoms are most urgent in plethoric children between 5 and 10, and in adults; and in the former case from eight to ten ounces of blood, in the latter from fifteen to twenty, may be drawn with advantage.

In general the symptoms now mentioned are greatly alleviated, or wholly removed by blood-letting. But if they should not be entirely removed under the means now specified, it is proper to apply blisters or sinapisms, or even to administer an antimonialized opiate. In the case of much *delirium* or *typhomania*, a blister to the nape of the neck is occasionally useful, or sinapisms may be applied to the legs and feet with advantage. When the respiration is very anxious, with much cough, the blister should be applied over the sternum, or between the *scapulæ*, or a draught consisting of thirty drops of solution of muriate of morphia, with half a grain of tartar emetic, will be beneficial.

In severe cases, where there is either bloody urine or other hemorrhages, or petechial spots on the skin, blood-letting is also indicated. But it is particularly important to keep the patient perfectly cool by means of light clothing, frequent or constant supplies of fresh air, and the use of cool drinks containing either lemon juice, tamarinds, or tartaric acid, or the dilute sulphuric acid.

Sydenham used to recommend small beer acidulated with sulphuric acid, and sometimes impregnated with sulphuric ether; but it is most grateful to the generality of patients alone, and lemonade, tamarind water, or tartaric acid are generally relished.

In general, as a part of the cooling regimen, it is important, as Sydenham has recommended, to keep the patient out of bed during the eruptive fever. It rarely happens, however, that, when the eruptive fever is violent, it is possible for the patient to move about or maintain the erect position; and the languor, sickness, and pain of the head and back, make him naturally take the horizontal posture. When, therefore, it is impracticable to keep him out of bed, the next most eligible measure is to keep him as cool as possible by light coverings, and by making him repose on a mattress rather than a feather-bed. A double sheet should be placed beneath him, or a covering of oiled silk interposed between the sheet and bed, as a means of securing cleanliness.

In some cases it is unnecessary to do more than shave the head, and give one or two doses of cathartic medicine, as all the symptoms of fever are alleviated on the appearance of the eruption. In cases of distinct small-pox especially, and of mild coherent or confluent small-pox, the appearance of the eruption puts a stop to all the symptoms of oppression of the brain, lungs, and heart, and irritation of the alimentary canal. All that is then requisite is to keep the patient cool, by means of light coverings and cool air, and the use of cooling watery liquors, to prevent, by the periodical exhibition of laxatives, the alimentary canal from becoming loaded, and, if there be much restlessness or sleeplessness, to administer about the ninth or tenth day an antimonial opiate.

It has been by some imagined, that blood-letting and other evacuating remedies were injurious in repelling the eruption or retarding its appearance, and in impairing the powers, so as to incapacitate the system from producing an energetic action

on the skin. This idea seems to be the result of prejudice and imperfect observation. At least I have repeatedly seen cases, both of measles, scarlet fever, and small-pox, in which blood-letting, instead of repelling the eruption, enabled it to come out with greater facility and less distress to the patient. I have therefore thought that, in cases of this class, the eruption was impeded or retarded by the intensity of the febrile disorder, and by the oppressed state of the circulation of all the organs. In this state it is important to remember that the disorder of the circulation in the variolous fever is one not of intense action, as it appears to be, but of perverted and almost extinguished action. The circulation in all the textures, the mucous membranes especially, and most of the internal organs, is very much impeded and almost interrupted; all the organs are oppressed with a load of stagnant blood; and hence the headach, delirium, panting, rapid respiration, sickness and vomiting, and bloody urine which are observed in intense and malignant cases. The vessels cannot be strengthened in order to move the blood thus congested within them; but the quantity of blood to be moved may be diminished, and the contents placed more completely in relation with the moving powers. This is effected by blood-letting; and in general after its performance we observe the actions to become freer, less oppressed, and more similar to those of health.

In the adoption of this mode of treatment, however, it must be borne in mind that its efficacy will mainly depend upon the promptitude and the early stage of the disease at which it is carried into effect. If it be delayed long, such a change takes place in the blood of the capillary vessels, that blood-letting and similar evacuations may have greater effect in diminishing the strength of the patient than in subduing the disease. It is difficult, however, to specify the particular time when blood-letting becomes too late a measure; and this must be determined by the symptoms of each case.

The measures already specified are chiefly calculated for the eruptive fever. If, by the adoption of one or more of these, its symptoms have either been moderated, or have not been allowed to be aggravated, and if the pustules on the face be distinct, or at least be not very confluent, and remain distinct on the person, little more in the way of active treatment becomes requisite. But if the number of pustules on the face be great,

or if they consist of numerous aggregated pimples, not suppurating mildly; or be mingled on the extremities with blisters and blebs; if the febrile symptoms either do not abate on the fifth or sixth day, or if after abating they return, or if the respiration be anxious, panting, rapid, or laborious, then the disease still requires much attention and vigilant observation.

In the least aggravated cases, in which the febrile symptoms do not abate, or recur, yet without symptoms of affection of the head or chest, the principal measures required are the use of cathartics daily to empty the bowels, with the due observance of the cooling regimen generally. I have found it requisite to administer almost daily the saline infusion of senna, or the compound powder of jalap, with an occasional full dose of calomel and jalap, or calomel and colocynth. It is of much moment to have the bed-clothes frequently changed, and the air of the apartment renewed.

In the same state patients may take butter-milk, whey, tea or coffee without injury. If the butter-milk purges, less medicine should be given, or it may be withdrawn for a day or two.

In cases in which the febrile symptoms are more violent, yet without distinct marks of local disorder, except that of the skin, an antimonial opiate, consisting of thirty drops of solution of muriate of morphia, with one-fourth of a grain of tartar emetic, may be given an hour before bed-time; and if under this, irritation be not allayed and sleep procured, the dose may be repeated, or twenty drops more may be given.

In cases of this description, the plan which I have found most eligible is to administer at bed-time a full dose of an opiate or an antimonial opiate, as the symptoms required, and next morning a drachm of the compound jalap powder, or four or six ounces of the saline infusion of senna, or an ounce of castor oil.

Another mode at this stage is to give, first, a pill consisting of six grains of calomel and three of colocynth, then an hour or two hours after, fifteen grains or a scruple of the compound powder of ipecacuan, and next morning from four to six ounces of the saline infusion of senna.

In some instances I have tried the diaphoretic effects of the liquor of acetate of ammonia or the antimonial solution; but I have not found them more powerful in abating febrile heat, or

allaying cutaneous irritation, and reducing the pulse, than efficient doses of laxatives alternated with the antimonial opiates.

In cases of confluent small-pox with much cutaneous irritation, the use of opiates is indicated upon the same principles as in the case of extensive burns; and in general their influence is equally conspicuous in allaying nervous and cutaneous irritation, producing sleep, and lowering the pulse, and rendering it softer and fuller. But the object is still more completely fulfilled if attention be given to allay the local irritation. It is often extremely useful to puncture several, if not many of the pustules and vesications, and to apply to the latter some light cool dressing which excludes the air, as the spermaceti ointment, or ointment made with mutton suet or marrow. In two cases I tried with the same intention the effect of cotton applied by tight bandages over the legs, but did not perceive that it afforded more relief than the method of puncturing the blisters and applying light dressings. In one case, it seemed by increasing heat to aggravate the distress of the patient.

The local disorders which most frequently take place in the suppurative stage of confluent small-pox, are either inflammation of the throat and base of the tongue, *bronchitis*, or *peripneumony*, or more rarely *laryngitis*.

Inflammation of the throat and base of the tongue, (*angina tonsillaris* and *glossitis*,) is indicated by difficulty in deglutition, with rejection through the nostrils of fluids drank, nasal voice and respiration, and ptyalism more or less profuse, with much stifling and sense of suffocation. For these symptoms the most prompt and effectual remedy is in adults, general blood-letting to the extent of twelve, fifteen, or eighteen ounces, in children to the extent of five or six, and in infants local bleeding by means of leeches applied to the angle of the jaw. Blisters have been commended by Cullen and others; but before and without blood-letting they are injurious, and afterwards they are often useless. The most effectual remedy next to blood-letting is the use of active cathartic medicine; and if the patient can swallow, this should never be omitted; since, if continued energetically from the commencement of the symptoms of ptyalism, it may often supersede the necessity of blood-letting. Too often, however, it is impossible for the patient to swallow; and in that case glysters are the only form of laxative medicine which are admissible. Coagulating gargles, as so-

lution of alum, sulphate of zinc, or nitrate of silver are also beneficial.

Opiates, which have been much used in this stage, are signally injurious to this affection, and have been justly prohibited by Tissot.

Bronchitis and peripneumony are indicated by the rapidity, panting, and labour of the motions of respiration, and *laryngitis* by the additional symptom of hoarseness, *aphonia*, laryngeal wheezing, and rapid motion of the larynx. In either case, if the strength and other symptoms do not contraindicate, and if the pulse be quick, tense, and full, or hard and oppressed, blood should be drawn from the arm to the extent of fifteen or twenty ounces, in an adult, and in a young person, or if the symptoms contraindicate general blood-letting, from six to twelve leeches should be applied over the front of the neck, corresponding to the *trachea*. The latter has the effect of emptying the vessels not only of the larynx and windpipe, but of the bronchial membrane, and thereby relieves the oppression of the motions of respiration.

The discharge should be immediately followed by the use of nauseating doses of tartrate of antimony, from one-eighth to one-fourth or one-half of a grain every hour; and if the use of these means be not followed by decided amelioration in the course of from thirty to thirty-six hours, it will be proper to administer calomel and opium, at the rate of two grains of the former to half a grain of the latter every second hour, until three doses are taken, after which, if the respiration do not become easier with or without expectoration, it is seldom requisite to carry the remedy further.

In laryngitis the same measures are to be employed.

In some cases in which the urine is scanty or suppressed, it is of great moment, next to blood-letting and keeping the patient cool, to administer acetate of potass, in doses of from ten grains to half a drachm or a drachm, or a powder consisting of ten grains of tartrate of potass, five grains of nitrate of potass, and five grains of aromatic powder.

The use of diuretic medicines, however, is condemned by Hoffman, apparently without sufficient reason as to the saline diuretics. It is also useful in this stage of the disease, both in children and adults, to envelope the lower extremities in flannel cloths wrung out of hot water.

The great object of the practitioner in employing the remedies now specified, is to obviate inflammation of the bronchial membrane and lungs, or to remove them if actually present. If this object be not attained, there is always ground for apprehension that the disease may terminate in chronic *bronchitis* or *peripneumony* with phthisical symptoms, or may cause in certain constitutions the deposition or infiltration of tubercular matter in the lungs. The judicious practitioner will therefore not only watch sedulously the state of the organs of respiration, and employ the remedies indicated by the symptoms, but he will take care, by allowing only the mildest and least stimulating diet, and preventing the use of wine or other stimuli, or a premature return to animal food or exposure to cold, not to aggravate the pulmonary symptoms while still present, or reproduce them after they have been subdued. Many are the cases in which patients, who have survived the suppurative stage of confluent small-pox, have, nevertheless, from exposure to cold or moisture, or the premature use of animal food, been attacked by violent *bronchitis* or *peripneumony*, terminating fatally, or have fallen into the chronic forms of the disease, with all the symptoms of consumption, proceeding speedily to the fatal termination.

In small-pox complicated with symptoms of gastric disorder, as sickness, hiccup, vomiting, and pain in the epigastric or left hypochondriac region, it is expedient to abstain from the use of tartrate of antimony, which is then contraindicated, and to apply ten or twelve leeches over the pit of the stomach, and exhibit the saline effervescing draught, with four or five drops of solution of muriate of morphia in each. Care should be taken not to allow the latter to be carried so far as to heat the skin, render the tongue foul, increase the thirst, or induce headach.

It is at the same time requisite to empty the bowels by means of glysters, and even to administer cathartic medicine after the epigastric uneasiness has been removed by means of local bleeding.

Concerning the use of cathartics and free purging in the suppurative stage of confluent small-pox much difference of opinion has been entertained by physicians. The administration of cathartics was practised by Sydenham, though to a small extent, and only about the twenty-first day. Morton was decidedly hostile to it; and it was again favoured and strongly

recommended by Freind, Mead, Tissot, Baker, and Huxham. It seems singular that Sydenham did not perceive that the continued use of cathartic medicine, after the commencement and during the course of the suppurative fever, would have not only mitigated all its symptoms, but, by maintaining a cool and uninflamed state of the system, have often superseded the necessity of blood-letting, which he thought requisite, and which was requisite to obviate bronchial or pneumonic or intestinal inflammation. The superior efficacy of the measure has been demonstrated by experience; and it is only requisite to explain the reason, and connect it with pathological principles.

I have already mentioned the circumstances which indicate the presence of irritation or congestion of the mucous membrane of the alimentary canal in small-pox. During the suppurative stage of the disease, whether from the action of the skin being so completely deranged, and its wonted secretions so much suppressed and perverted, or from the general inflammatory state of the system, and especially of the two great surfaces, the cutaneous and mucous, and their nervous connection, symptoms of remarkable irritation of the intestinal mucous membrane arise. In cases in which laxatives have been sparingly given, or have not been efficient, the abdomen is full and distended, often tender and sore, with sense of weight in the umbilical region, the tongue is much furred, the skin is dry, and the pulse full, throbbing and undulating. Colic pains and *tormina* ensue; and unless means are used to allay this irritation, diarrhœa almost certainly follows. If cathartics have been given from the commencement, these symptoms rarely follow; and if they do, they are temporary, and are checked by the exhibition of four or five colocynth pills, followed by a drachm of the compound jalap powder, or an ounce of castor oil. Where these precautions have been neglected, however, the mucous membrane of the intestinal canal becomes irritated and congested; its vessels are loaded with blood; and much foul and unhealthy secretions with air are accumulated in its cavity. The circulation of the liver is at the same time perverted, its secretion impeded, and the organ becomes enlarged and tender. The diarrhœa, which almost invariably ensues is the effect of this intestinal irritation, and is in some sense an effort of nature to remove it, and should not be rashly checked. It is always better, however, to prevent its occurrence before it has become very violent. This may be effected by the use of active cathartic medicine, as

already mentioned, alternated with antacids, as a little lime-water, chalk, and a few drops of solution of muriate of morphia, merely to enable the patient to bear subsequent doses.

In general the best laxatives are the colocynth pill, or the compound jalap powder, followed by castor oil, or the saline infusion of senna. It is often proper, however, where there is much distension of the belly with a tympanitic sound, to give two scruples or even a drachm of the compound powder of rhubarb and magnesia. Calomel and chalk, or mercury and chalk, (*hydrargyrus cum creta*,) have been recommended in this species of diarrhœa; but they have no advantage over the other antacids and laxatives.

If, after the first doses of these medicines, there be distension in any part of the belly, with pain aggravated by pressure or coughing, it will be proper to apply ten or twelve leeches, and favour the bleeding by means of warm poultices of linseed meal or bran.

The cathartics should be continued daily so long as the tongue is whitish, or rough and dry, the pulse quick or throbbing, or the skin dry, or there be any tendency to diarrhœa. At the same time, the diet ought to be restrained, and no animal food or soup allowed.

If these measures be continued from the eleventh or the fifteenth day, to the twenty-first or twenty-second, according to their effects and the symptoms, the recommendation to draw blood during convalescence, as given by Sydenham, and repeated by Mead, will become superfluous. Freind appears to have been the first who fully appreciated the efficacy of this mode of treatment; but it is remarkable that while he was desirous to prove its utility not only by the authority and experience of Al Rhazi, Marcellus Donatus, Mercurialis, Campolongo, Mercatus, Baillou, and Chicot, but from his personal observation, he does not appear to be aware of its value in superseding the necessity of blood-letting.*

The influence of cathartics at this stage of the disease is further beneficial, not only in removing congestion of the gastrointestinal mucous membrane, but also in obviating general plethora, and the tendency to bronchial inflammation. There is at this period great hazard, lest, while the bronchial membrane and lungs are still irritable and easily excited to inflammation,

* *Epistola de Purgantibus in Secunda Variolarum confluentum Febre adhibendis*, Lond. Sept. 1719.

either upon exposure to cold and moisture, or returning to the use of animal food, bronchial or pneumonic inflammation be induced. The most effectual mode of obviating this and all its consequences is the periodical and efficient employment of cathartics.

Under the mode of treatment now sketched, and the remedies already specified, with mild unstimulating diet, most instances of confluent small-pox, which are susceptible of recovery, will proceed to a favourable termination. In cases of more malignant character, it is of little moment what is done; and it would be better for the physician to do nothing, or merely alleviate symptoms, than to adopt means which may be useless or even injurious.

In the typhoid or nervous form of the disorder, and in that attended with gangrenous spots and *petechiae*, many physicians have recommended bark, serpentaria, contrayerva, camphor, musk, saffron, and other remedies of supposed tonic, antiseptic, and cordial properties. The symptoms designated as typhoid and nervous are very generally the effect of oppression of the brain and spinal chord, and those denominated septic or gangrenous are as generally the result of excessive congestion of the capillary vessels. Both are the effects of the disease being allowed, by a mode of treatment sometimes inert, sometimes heating and stimulant, to proceed to the stages of capillary oppression and disorganization; and, if appropriate measures with cooling regimen be seasonably adopted, these results are not observed to take place. When they have taken place, neither bark, serpentaria, nor contrayerva, neither camphor, musk, nor saffron are of the smallest avail, and unless the progress of the symptoms alluded to is to be arrested by the same means, by which their appearance might have been prevented, they will proceed, notwithstanding the use of such agents, to the fatal termination. It is to be observed, nevertheless, that these symptoms are not of themselves necessarily fatal. It is upon the state of the vascular and nervous systems which they denote, that depends the termination of the disease. Simplicity in treatment is the great means by which efficiency is most likely to be insured. When, therefore, the symptoms now referred to supervene, the safest plan is to adopt the cooling regimen in all its force, to administer glysters, and apply sinapisms to the extremities, and to combine with

these a moderate allowance of light wine, or port wine and water, and an antimonial opiate at bed-time, if by these measures heat, thirst, and restlessness are not aggravated. If the use either of wine or opium augment heat and thirst, or increase restlessness, they ought to be entirely abandoned.

In some instances a most favourable change is effected in this stage of the disease, by free exposure to the open air, and by removing the patient to another locality.

The treatment of particular symptoms in small-pox becomes occasionally important. To the symptom of excessive ptyalism as a symptom of inflammation of the throat, I have already adverted; and beyond the means of abating the inflammation of the guttural mucous membrane, and the use of astringent gargles, or the inhalation of hot vapour impregnated with chlorine, or the application of the lunar caustic solution, it is seldom requisite to employ particular measures.

The swelling of the face with the closure of the eyes, and the itching of the eruption, often cause great distress to the patient. The first and second subside in the course of the eleventh or twelfth day, under the use of the means employed to abate febrile disorder. For the second, it is usual to apply almond oil, carron oil, cold cream, or any other soft cooling liniment.

That the practice of puncturing and cutting the pustules was followed by the Arabians, we learn from the testimony of Al Rhazi. In modern times it was practised and recommended by Marquard, Fortis, Holland, Sidobre, Senac, Tissot, De Haen, Van Swieten, and Wintringham; and though it has been opposed by Diemerbroeck and Ludwig, it has been more on speculative than on practical grounds. It is a source always of great relief to puncture the largest pustules, or those which are situate in parts which are liable to pressure or exposure; and the greater the number of these that can be divided, the more effectual and permanent will be the relief. The division of the blistered patches especially, on the feet, also affords great relief.

Many proposals have been made to preserve the face from being seamed and scarred with the variolous marks and pits; but none can be said to have been attended with success. Al Rhazi has left a long catalogue of liniments and unguents for the purpose of effacing scars and marks, * all of which are quite inefficient. The same object was attempted to be obtained by sun-

* De Variolis et Morbillis Commentarius, caput xi.

dry European physicians, by moderating the general violence of the disorder, and assuaging the severity of the eruption. This the Silesian Jews studied to accomplish by the application of leeches to the thighs; and though the practice appears to have had no great success, it was commended by Rudius, Ridel, and Bauderon, but appears not to have been imitated. Fischer recommended tepid and warm baths, first of fresh water, then of whey or milk, to prevent scars and pits of the face, and protect the eyes. For the same purpose, Verdries applied blisters behind the ears and to the nape of the neck; and others relied upon shaving the head. Baglivi recommended scarification between the shoulders and other remote parts, —a method praised as very effectual by De Tharding, who has left for its performance specific instructions. *

There is little doubt that the only effectual mode of diminishing the chance of scars, for to obviate or prevent them is impossible, is the use of those means which are calculated to allay the general violence of the disease. If each pustule is caused by a slough, as John Hunter maintains, it is manifest, that to prevent the depression in the true skin, is a physiological impossibility. All that human power can accomplish in such circumstances is to render the subsequent inflammation as mild as possible.

Lastly, it is of great importance to change the bed-clothes and personal linen as frequently as circumstances admit; and in so doing it ought to be an indispensable precaution, that the articles removed should be kept immersed in vessels filled with cold water.

The severity and the mortality of small-pox has led several philanthropic physicians to think of the means by which so unmanageable a disease might be completely extirpated. Very nearly at the same time, Dr Haygarth in England, and Francis Maria Scuderi, a Sicilian physician at Naples, proposed plans for the extinction of small-pox in their respective countries. The methods proposed were in many respects similar. The method suggested by Dr Haygarth rested on the principle of a general inoculation, which was to be conducted by inspectors, who should prevent all intercourse with the unaffected and sus-

* Apud Haller Dissert. Medico. Pract., Vol. v. p. 630.

ceptible.* The Sicilian, on the other hand, proposed isolated houses for the reception of the infected, who were to be separated from the sound, and placed under the superintendence of local deputies.† Neither proposal seemed to be accordant with the spirit of free government, and both were suffered to languish for years in neglect, chiefly from their impracticability. It was most fortunate, that at the period when Dr Haygarth was most intensely engaged in maturing his scheme, and demonstrating its practicability and advantages, Dr Jenner succeeded in ascertaining the antivariolous powers of vaccination, and thus provided one of the most effectual means of realizing the intentions of Scuderi and Haygarth.

§. II. Chicken-pox, Swine-pox. *Varicella*; *Variolæ Spuræ*, Borsieri. La Petite Verole Volante; Verrete; Verolette, French. Wind-pocken, Hüner-pocke, Germ. Ravaglione et Morbiglione, Etruscis. Vajuolo selvatico; et Schiopetti, Ital. Esclapete Occitanis. Wietrzna Ospos, Polon.

J. Phil. Ingrassias de Tumoribus praeternaturam, Neapoli, 1553, Lib. i. Cap. i.—Vidi Viddi Ars Medicinalis, Venetiis, 1596 et Francofurti, 1626, Part ii. Lib. xiii. Cap. vi. De Variolis.—Hatté la Verolette ou la Petite Verole Volante. Paris, 1759.—Heberden in Medical Transactions, Vol. i. xvii. On the Chicken-Pox, 1767, London, 1772.—R. A. Vogel de cognoscendis et cur. prae-cipuis Corp. hum. affectibus, p. 94.—A. Muhrbeck Dissert. de Variolis spuris Goetting. 1794.—Seguy, Annotations sur le diagnostic et les noms de la Verolette, 1803.—R. Willan on Vaccine Inoculation, 4to, London, 1806.—Heim uber Diagnostik der Falschen Pocken in Horn's Archiv. fur Pract. Medecin. Jahrg. 1809.—Montesanto Considerazione medico-pratiche sul Vajuolo spurio o Ravaglione. Padova, 1816.—Berard et Delavit, Essai sur les Anomalies de la Variole et de la Varicelle. Montpellier, 1818.—(See also the Books mentioned at the beginning of last Section.)

The eruption, to which the names of Chicken-Pox and Swine-Pox have been applied, and which has been distinguished from small-pox, both popularly and professionally, is in general a slight disease, and is attended with so little inconvenience or danger as scarcely to merit notice. The consequence, however, which it does not of itself possess, it derives from its resemblance to small-pox, with which it was always considered as allied, to which it probably bears an intimate relation, and with which it has been often confounded.

Physicians had long observed an eruption of vesicles or ve-

* Inquiry how to prevent the Small-pox, Chester, 1784, and Sketch of a Plan to exterminate the casual small-pox from Great Britain, London, 1793.

† Memoria in piu restretta forma, &c. in Napoli, 1787.

sicular pustules more or less large, and in general distinct, similar in many respects to small-pox, but passing through their respective stages more quickly and in shorter time, seldom or never suppurating, and preceded by febrile symptoms of less severity. From the pellucid serous character of their contents, and the absence of much inflammation also, they were distinguished by Vidius and Ingrassias in the middle of the sixteenth century under the name of *Crystalli*.

From the closeness of the resemblance of this eruption with that of small-pox, it was very generally considered as a variety of that disease. But, as it was more rapid in course, and milder in symptoms, and as it occurred in persons who had passed through small-pox, and its occurrence in others did not preclude an attack of that disease, it was generally known among physicians as a bastard, spurious, or imperfect form of small-pox, (*Variolæ Spuriæ* ; *Variolæ Illegitimæ* ; *Variolæ Nothæ*.)

The closeness of the resemblance of this eruption to small-pox is believed to have caused it not unfrequently to be confounded with that disease; and hence several of the cases of supposed second attacks of small-pox are doubtless to be referred to the head of Chicken-pox.

In 1767, Dr Heberden, in the first volume of the Transactions of the College of Physicians, adduced various arguments to show that chicken-pox and swine-pox were quite distinct from small-pox, and in proof of the justice of his views, gave a more minute description of its phenomena, course, and duration, than had yet been done. In this distinction, most of the physicians of this country acquiesced; and though it was less generally received on the continent, the example of Borsieri and Vogel, and the descriptions of Muhrbeck and Seguy, made it at length be recognized as an eruption which should not be confounded with that of small-pox.

The introduction of vaccination gave rise to a new species of variolous or varioloid eruption; one, namely, in which the genuine variolous characters were modified by the mildness and short duration of the febrile symptoms, the vesicular and unsuppurative character of the eruption, and their consequent more speedy termination. As these characters caused the modified variolous or varioloid eruption to make a near approach to the spurious small-pox or chicken-pox, it became requisite to examine anew the respective characters of each eruption, and con-

sider whether a distinction could still be drawn between them. This was done in 1806 by Dr Willan, who, in his treatise on Vaccine Inoculation, gave a new description of their appearance and progress, and increased the number of diagnostic marks. These were generally confirmed by Heim in 1809. But since that period various circumstances have occurred to throw some doubt on the sufficiency even of the diagnosis of Dr Willan; and several new marks were suggested by Dr Abercrombie and Mr Bryce in this country, and Dr Luders and Mohl on the continent. The adequacy of these marks has not yet been admitted by Dr Thomson and some others; and the question must be regarded as undetermined.

It appears to me, nevertheless, that the description of chicken-pox given by Heberden, and modified and rectified by Willan, furnishes a sufficient number of characters to enable the physician to distinguish exquisite and well-marked cases of chicken-pox from exquisite and well-marked cases of small-pox; and if there occur cases in which the characters may be said to glide into each other, still there are many others in which, so far as mere observation goes, the respective characters of each are distinct. To these chiefly the nosologist must direct his attention, without looking to the exciting cause; and if it be ultimately determined that both proceed from the same morbid animal poison, it will afford a striking proof of the principle, that almost every thing depends on the constitution of the individuals, and on the character of the epidemic.

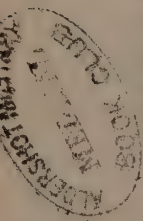
Of chicken-pox three species may be recognized. The first is the chicken-pox proper (*Varicella aquosa*, *Varicellæ crystallinæ*, Vogel; the *Varicella lenticularis* of Willan; Die Wasser oder Wind-pocken of the Germans.) The second is the conoidal or pointed chicken-pox (*Varicella acuminata vel verrucosa*; the *Varicella conoides* of Willan; Die Spitz-pocken, Die Stein-pocken,) Horn-pock and Stone-pock. The third is the Swine-pox or Hives (*Varicellæ ovillæ vel suillæ* of various authors, Die Schweins-pocken, Die Schaff-pocken of the Germans, and the *Varicella globata* of Willan.)

1. The lenticular varicella or true chicken-pox (*Varicella lenticularis*) is distinguished by an eruption on the first day of small red knotty protuberances, not exactly circular, having a flat shining surface, with a minute vesicle in the centre. On the second day, when the vesicle is filled with white semitrans-

parent lymph, it resembles a miliary vesicle about one line in diameter, but is not so tense, prominent, or regularly circumscribed, and affects the oval shape. On the third day, when the fluid is straw-coloured, the size of the vesicles is much the same, and their figure is generally distinctly oval. On the fourth day, many are broken, and the rest shrunk. On the fifth day, few remain entire; and on the sixth, appear universally in their place, small thin brown crusts or scabs, which on the ninth and tenth drop off, leaving red blains, but without depression.

2. The conoidal chicken-pox, (*Variolæ verrucosæ benignæ, sive acuminatæ*, Vogel; *Varicella conoides*,) is characterized by the sudden appearance of pointed vesicles surrounded by a hard red border, and containing a bright transparent fluid. On the second day, when the fluid is slightly straw-coloured, they are more turgid, and are surrounded by more extensive redness. On the third day they are shrivelled; some, which are broken, are covered with thin soft glutinous crusts formed by the concretion of the fluid; others, which remain entire but retain their redness, evidently contain purulent fluid; and upon drying into crusts they leave a permanent depressed scar or pit. They dry, separate, and drop off in four or five days; and, as a fresh eruption generally takes place on the second or third day, and passes through the same course, the duration of the eruptive stage of conoidal chicken-pox is six days, and that of the whole disease till the process of decision is eleven or twelve days.

3. The Swine-pox or Hives, or globate chicken-pox (*Varicella globata* of Willan,) corresponding, perhaps, to the *Variolæ duræ ovals* of Vogel, is an eruption consisting of large globated or hemispherical vesicles not quite circular, but often a little larger than the pustules of small-pox, (Vogel and Hildenbrand,) surrounded with a red margin, and containing a transparent fluid, which on the second day of eruption resembles milk whey. On the third day they subside, are shrivelled, and present a yellowish tint, in consequence of the admixture of purulent fluid with their proper lymph. Before the conclusion of the fourth day they are converted into thin blackish scabs, which dry, and in four or five days more fall off. The eruption is usually completed in three days. But if fresh vesicles appear on the fourth, this stage is prolonged to the eighth day, so that the whole disease is usually completed within this space of time.



Heberden represents chicken-pox to appear in some persons without any illness or previous symptom of their approach. There is reason to believe that this is erroneous, and that, however slight the disorder may in some cases appear, some symptoms of eruptive fever always precede the eruption. Willan, at all events, states, that in no case of chicken-pox did he observe the eruption take place without some previous disorder of the constitution.

The fever of chicken-pox commences two or three days before the appearance of the eruption, and though it generally is abated upon the developement of the vesicles, it sometimes is continued to the third day of eruption. Its symptoms are languor with disposition to sleep, loss of appetite, thirst, heat of skin, occasional flushing of the cheeks, cough which is sometimes severe, sore throat, with diffuse redness of the membrane, white furred tongue, quick but variable pulse, pains of the head, back, and limbs, and sometimes of the epigastric and umbilical regions, with sickness, and vomiting of bilious matters. These symptoms may be very violent, or so slight as to be overlooked; but in no case are they altogether wanting.

The eruption usually appears first on the breast and back, next, on the face and scalp, and lastly, on the extremities. It is attended, especially in children, with incessant itching or tingling, which makes them remove by scratching the tops of the vesicles, so that the characteristics of the eruption are often effaced at an early period. Many of the vesicles thus prematurely broken, but not removed, are soon surrounded by inflammatory redness, and afterwards become pustules containing thick yellow purulent matter. These continue three or four days, and finally leave pits on the skin.

The eruption is usually most copious in the conoidal variety. The vesicles may be close set or coherent, but are seldom confluent. When they are numerous on the scalp, the cervical glands may be enlarged.

The DIAGNOSIS of Chicken-Pox from Small-Pox must be founded not on a few characters, as Heberden and Willan attempted to do; but on the whole respective phenomena of both diseases. The following circumstances seem to embrace the most important pathognomonic characters.

1. Chicken-pox emit a peculiar odour, different from that of small-pox, and less decidedly partaking of the variolous fetor.
2. Chicken-pox appear indiscriminately, and almost

equally all over the person, beginning first on the trunk in general, and then appearing on the face and scalp; while small-pox appear first on the face and neck, and are more numerous in the face than in any other part. 3. Chicken-pox eruption is generally completed in the space of twenty-four hours, or solitary vesicles come out irregularly afterwards in different points; but in small-pox the eruption begins in the evening of the third, or morning of the fourth day, and proceeds regularly for the ensuing three days, until it is completely established. 4. While variolous pustules are on the first and second day of the eruption small, hard, globular, red, and painful, and communicate to the finger a sensation similar to that which would be excited by the presence of small round seeds under the cuticle;—in chicken-pox, every vesicle almost has on the first day a hard red margin, but communicates to the finger a sensation like that from a rounded seed flattened by pressure. 5. On the second or third day of the eruption of chicken-pox, the individual bodies are vesicles containing serous fluid, and giving them a whitish aspect. 6. These vesicles are surrounded by little or no inflammatory redness, and do not naturally, and independent of external violence, proceed to suppuration. 7. Chicken-pox may be confidently distinguished from small-pox on the third and fourth days, by the state of the vesicles, some of which being left entire are shrivelled and wrinkled, while others, whose ruptured tops have been closed by incrustation of their fluid, are marked by radiating furrows. None present depressions on the *apices*; and as they do not suppurate, they incrust and disappear sooner than variolous pustules. 8. The marks left by chicken-pox, when they do leave marks, present a peculiar conformation, being round or elliptical, and less frequently irregular than those of small-pox, and in general smooth and shining. Lastly, it is said by Luders, that while small-pox is formed in the *cutis vera* or corion, the chicken-pox eruption is formed in the cellular tissue situate between the corion and cuticle.

The distinction between chicken-pox and modified small-pox, or small-pox occurring in the persons of the vaccinated, is still more difficult to be satisfactorily established, in so far as all varieties of the disease, from the mildest to the most intense, have been observed to take place under these circumstances.

Chicken-pox is supposed to depend upon the operation of a

peculiar animal poison, which, according to some, is the same as that which produces small-pox, and, according to others, as Heberden, is different. The principal argument in favour of its being different is derived from the fact, that chicken-pox is said often to prevail in communities and localities, where there are no cases of small-pox. In opposition to this, however, which has been repeatedly denied, it is argued that where small-pox is epidemic, chicken-pox is observed to prevail, and that, in short, chicken-pox is merely the mild form of the disease called small-pox.

Dr Thomson particularly inferred from the phenomena of the epidemic varioloid disease which prevailed in Edinburgh and Scotland between 1816 and 1821, that, as it was impossible to distinguish chicken-pox from modified small-pox, according to the marks assigned either by Heberden or Willan, and as both diseases occurred under the same circumstances, they were varieties of the same disease. A similar opinion is entertained by Hildenbrand, who thinks that chicken-pox are a hybrid or spurious product of small-pox.

The treatment is the same as in mild distinct small-pox.

§. III. Itch; *Die Kratze, Das Jucken, Germanorum; La Rogna, La Scabbia, Italarum; La Gale, Gallorum.*

Itch consists of an eruption of pimples, small vesicles, or pustules, or of vesicles, which are subsequently mixed with, and converted into pustules, with constant itching, on the wrists, fingers, flexures of the joints and folds of the skin, excepting that of the face—unattended by fever, and generally in consequence of contagion. Among the various forms which the disease assumes, the vulgar have distinguished four by the respective names of the Rank, Watery, Pocky, and Scorbutic Itch, which are represented in the arrangement of Willan by the respective characters of *Scabies papuliformis*, *Scabies lymphatica*, *Scabies purulenta*, and *Scabies cachectica*. These are distinguished by the following characters.

1. Rank itch (*Scabies papuliformis*,) consists of an extensive eruption of minute itching vesicles, slightly red, and acuminated like pimples to the naked eye, appearing first on the skin of the wrists, between the fingers, or on the pit of the stomach, afterwards on the arm-pits, hips, and flexures of the joints in general, where they are numerous and intermixed with hard pustules (*phlyzacia*) containing thick yellow matter. The itching

is extremely troublesome, especially when the patient becomes warm in bed, and causes frequent scratching, which detaches the tips of the vesicles and pustules, and leaves long red lines in the skin, while blood and purulent matter are hardened on the affected parts into small brown or blackish scabs. These accidents render the rank itch liable to be confounded with the sun rash and itching rash (*Lichen* and *Prurigo*,) from which it is practically important to distinguish it. From the former it is to be distinguished by the vesicular character, by the formation of scabs or crusts, not scurfy exfoliations, by the absence of constitutional disorder, and by its contagious mode of propagation. From the itching rash (*Prurigo*,) it is to be distinguished in like manner by its vesicular character, which is obvious on inspection, by the formation of scabs, and the local spots of the cutaneous surface which it occupies. From the nettle rash it is distinguished by the absence of wheals.

2. Watery Itch (*Scabies lymphatica*) is distinguished by the appearance of large transparent vesicles, without redness of base, intensely itching,—rising successively round the wrists, between the fingers, on the back of the hands, on the feet and toes, and on the arm-pits, hams, and flexures of the joints in general, but not like the rank itch, on the pit of the stomach or upper parts of the arms and thighs. In a day or two the vesicles break; when some heal under the small scab which is formed by their fluid, others inflame and become pustules discharging yellow matter, and enlarge into ulcerated blotches, which are ultimately covered by a dark-coloured scab. The simultaneous existence of these appearances will enable the observer to distinguish the watery itch from the varieties of fret and gall, with which it is liable to be confounded. The exciting causes must also be kept in mind in distinguishing it from the latter, especially those local varieties resulting from the application of irritating substances.

3. Pocky Itch (*Scabies purulenta*,) begins with red elevations of the cuticle, which are soon converted into distinct, prominent yellow pustules, first on the hands and feet, especially about the knuckles and roots of the toes, between the fingers and round the wrists; after two or three weeks about the arm-pits, on the back and shoulders, on the arms near the elbow, and thighs near the knee, on the hollow of the hips, and sometimes on the pit of the stomach. They are largest about the hands and wrists, often exceeding two lines in diameter, and of a globular shape, and

smallest in the epigastrium. In two or three days after their first appearance, they mature and break, terminating in irregular blotches or painful ulcers, with hardness and elevation of the surface, and are finally covered with hard dry scabs, which adhere firmly for some time. It occurs most commonly in children between the ages of seven and puberty. It is distinguished from moist tetter (*Impetigo*) by the size and prominence of the pustules, by the intense itching and contagious propagation; from scall-head (*Porrigo favosa*), by its local situation, by the matter discharged, and by the thin hard permanent scab; and from the great pock eruption (*Ecthyma*), by the absence of hard, raised, red or livid base, by more rapid progress, itching, contagious propagation, and the mode of termination.

4. Scorbutic Itch (*Scabies cachectica*), exhibits all the variety of appearances which belong to the three foregoing species; but is combined with patches resembling sun-rash, scaly tetter, or moist tetter, especially in adults or young persons approaching the period of puberty. In this double character it may be contagious; but as its itch-like nature disappears, it becomes more obstinate and tedious. It may originate independently of contagion in the persons of weakly and imperfectly nourished children, whatever be the cause of such imperfect nourishment, and in adults whose strength is much impaired by acute disease, or even by long-continued bad health.

Bateman observed a severe degree of scorbutic itch in persons, especially children, brought from India. The eruption is rank and extensive, spreading sometimes to the face, and giving the skin a more dark and dingy hue than ordinary itch, and with a considerable mixture of confluent tetter-like pustules. It is very contagious, and refractory under the operation of remedies.

A violent form of itch may arise from handling dogs, cats, hogs, and other animals affected with *Mange*. It consists of numerous rank pustules, red and hard at the base, extending over the whole body. The surface of the skin becomes rough, and brown or dingy; and the irresistible scratching in consequence of intolerable itching, causes extensive excoriations and abrasions.

Though itch is contagious, and generally communicated by actual contact either with the persons or clothing of those affected, its extreme frequency where habits of personal cleanli-

ness are neglected, appears to show that it may originate spontaneously in favourable situations. It is, for example, very common among the families of the poor, in work-houses, jails, and hospitals. It must not be forgotten, however, that when once introduced into families, where every attention is given to cleanliness, it will frequently spread, in spite of every precaution, to all the individuals, young and adult, and continue till the proper remedies are employed. Does it depend uniformly on a specific poison, and are filth and sordid habits mere accessory causes?

The opinion that itch depends on a particular insect burrowing in the skin has been maintained successively by Ingrassias, Mouffett, Bonomo, Mead, Dover, Cestoni, Cinelli, Morgagni, Crell, Linnæus, De Geer, Rochard, Tozzi, and Wichmann; and has been opposed by Baldinger, Jonas, Volkmann, Hartmann, Sagar, Weise, Alexander, Mieg, and Joseph Adams, the last of whom proved that certain insects, of which he gives delineations, (*ouçoes*, *ouçam*,) may penetrate the cuticle, and give rise to a papular and vesicular eruption; but that this disease is not itch, and that there is no proof that itch ever arises from such cause.* Bateman is of opinion, that, if it ever occurs in any form of itch, it is an accidental combination; and that the contagious or poisonous property of itch exists in the fluid secreted during the pustular inflammation. Latterly, M. Raspail, who had previously described an insect found in the scabious pustules of the horse, discovered in the scabious pustules of the human body a minute microscopical *entozoon*, which he regards as the insect of the itch, and which accords in characters with the animal represented by De Geer. (Bulletin Gen. de Therap. Sept. 1834.)

For the removal of this disease, sulphur has been long known to possess specific powers. It may be given internally in the form of electuary, or in any viscid or semifluid substance; and its steady application externally in the form of sulphur ointment, for five or six nights, will cure ordinary cases, though more inveterate cases require to be treated in this manner for a fortnight. Sublimed sulphur is the ordinary form in which this medicine is administered; but I have repeatedly observed the washed sulphur (*sulphur lotum*,) to be more speedy and more certain in its operation. In the form of vapour it may be used with great success.

* Observations on Morbid Poisons, by Joseph Adams, 4to, 2d edit. p. 293, 309.

Sulphuric acid mixed with lard and applied by friction was long ago recommended by Crollius; and it possesses the advantage of being inodorous and cleanly. According to the observation of Bateman it is uncertain in its effects.

Corrosive sublimate and the white precipitated oxide of mercury possess considerable efficacy in relieving itch. The former, which was strongly recommended by Dover, is very efficacious in relieving the itching rash (*Prurigo*), and other itching eruptions; but it is not entirely destitute of power in common itch. In favour of the white precipitate there are numerous testimonies; and it appears well adapted to the scorbutic or tetter-like (impetiginous) form of the disorder.

Lastly, a powerful and cleanly remedy is found in the chloride of lime, applied either suspended in water, or combined with lard in the form of ointment, in the proportion of half a scruple or a scruple of the chloride to seven drachms of lard. The remedy is in all probability the chlorine.

Among vegetable substances, tobacco, white hellebore (*Veratrum album*), and leadwort (*Plumbago Europæa*), are said to possess sanative powers of considerable efficacy. The former are applied either as an ointment or in decoction. The root of the latter is pounded and mixed with boiling oil.

§. IV. Moist or Running Tetters; Dartres; (*Impetigo*.)

This eruption consists of minute eminences, partly vesicular, partly pustular on the extremities, independent of contagion, not communicable by inoculation, and without fever. They appear to be mere inflamed points, quickly causing the secretion of thin fluid, soon becoming puriform, and raising the cuticle into vesiculo-pustular eminences; (*Psyrakia*.) It has been observed to occur under five several forms; the figured (*I. figurata*;) the sparse (*I. sparsa*;) the rose-like (*I. erysipelatodes*;) the scabby (*I. scabida*;) and the phagedenic or gnawing (*I. rodens*.) Their characters may be stated in the following manner:

1. Figured Tetters, Ring-worm (*Impetigo figurata*), small yellow pustules with red border, not prominent or pointed, close set in circumscribed patches of various shape and size, small and circular on the arms, large, oval and irregular on the legs. In a few days the pustules break and discharge fluid, the surface becomes red, raw, stretched and shining, but exhibiting numerous minute pores, from which a thin fluid is discharged,

with much heat, itching, and smarting, and partially hardens as it flows into thin green or yellow scabs. In the course of three or four weeks, as the discharge diminishes, the scabs dry and fall off, leaving a red, shining, rough cuticle, somewhat thickened, but very brittle, and liable to crack and be detached. The discharge and scabbing may thus be reproduced, with the effect of protracting the duration of the disease. Fresh crops of pustules may also appear, with the same effect. When it begins to heal, the centre of the patch subsides, leaving the border elevated;—this also disappears, but the cuticle, which was the seat of the pustules, remains for weeks red, tender, and glistening.

In other instances, fresh pustules rise at the margin of the patch, and while the inner one dries and scabs, an outer appears, so as to enlarge considerably the extent of the patch, leaving the central space, dry, rough, and scaly.

A severe and tedious variety of moist figured tetter sometimes occurs on the wrist, hand, knuckles, and sides of the fingers, or in the skin between the metacarpal bone of the fore-finger and thumb. The psydracious pustules of tetter are mixed with transparent vesicles, not much elevated, and very slow in progress. When they break, they discharge an acrid fluid, which produces inflamed points where it touches the cuticle, afterwards becoming vesicles or psydracious pustules. The vesicles thus broken are not disposed to heal; and the adjoining skin becomes red and elevated, discharging a thin fluid when irritated. As they rise in slow succession, separate from each other and from the pustules, the whole disease at length forms an irregular blotch of red, chopped, thickened cuticle, interspersed with rising vesicles, small ulcers and chops or fissures. The whole process is attended with extreme itching, scalding, and smarting, is generally aggravated by irritating applications, and is always tedious and difficult to manage.

2. In sparse or diffuse tetter (*Impetigo sparsa*,) the pustules, instead of being in figured or irregular clusters and patches, are dispersed in no regular order along the extremities, about the neck and shoulders, but chiefly on the legs and thighs. In elderly persons, or those of weak and broken constitution, the excoriations to which they give rise may become deep irregular sores, with a purple margin, and accompanied with œdema.

To this head may be referred the grocer's itch and brick-layer's itch when pustular. (See above, at Eczema.)

These two forms of tetter are to be distinguished from scall-head and itch, with which they have been sometimes confounded even by practical authors. Attention to the characteristic marks of each will easily prevent this mistake.

3. Rose-like tetter (*Impetigo erysipelatodes*.) After slight febrile symptoms for two or three days, it begins with redness and puffy swelling of the upper part of the face, and œdema of the eyelids. This surface, instead of the smooth uniform swelling of rose, is found to be slightly unequal or rough; and in a day or two numerous minute straw-coloured pustules (*psydracia*,) appear first below the eyes, then on the face, and sometimes extend to the neck and breast, with distressing heat, itching, and smarting. They soon break and discharge a fluid, which is said to be hot and acrid, adding much to the smarting of the excoriated surface. In this state the face continues for ten or twelve days, when the discharge begins to diminish and thicken into thin yellow scabs; while in the intermediate spaces fresh pustules arise, and go through the same process, with the same distress to the patient. In this manner the disease may continue one, two, or three months, ultimately leaving the scarf skin red, dry, and brittle. During its course other forms of moist tetter may occur on the extremities. The constitutional derangement though slight, is distinct at the outset, but subsides and disappears as the eruption goes on.

4. Scabby tetter (*Impetigo scabida*.)—Numerous psydracious pustules on the arm from the elbow to the wrist, or on the leg from the knee to the ankle, form, break, and discharge abundant fluid, which about the third or fourth week begin to abate, and dry into a thick yellow scabby crust, which at length enclose the affected limb, not unlike the bark of a tree, so as to render motion difficult. It is attended with painful heat and itching. In a short time, the scabby crust is divided by cracks discharging a thin fluid, which again dries into additional scabs. If any portion of the scab be removed, the raw surface again discharges fluid, which fills up the space with a fresh concretion. In the lower extremities the disease is severe and obstinate, and may give rise to bad sores, or be conjoined with anasarcaous swelling. The incrustation and its cause may extend to the fingers or toes, the nails of which it may destroy; the new ones being thick notched and irregular.

5. Gnawing or Phagedenic tetter (*Impetigo rodens*.)—This rare form of the disease commences generally on the side of the

trunk, with a cluster of pustules, sometimes intermixed with vesicles, which soon break, and discharge for a long period an acrid fluid from open pores or beneath scabs; the skin, adipose and filamentous tissue are slowly destroyed in a corroding and painful process of ulceration; and as this process penetrates to the subjacent tissues it spreads in every direction till it proves fatal. It is supposed to be of a cancerous nature.

The causes of moist tetter are not always very obvious. A predisposition to the disease is said to be connected with the sanguine temperament, with a thin soft skin, and relaxed, bloated habit, or with the sanguineo-melancholic temperament, spare form, and thin hard skin. These opinions show that little is satisfactorily known on the subject. Perhaps it is more correct to say that the ordinary causes of cutaneous inflammation, as cold, fatigue, intemperance, or any thing which deranges the process of digestion and those of secretion, or which irritates the mucous membrane of the alimentary canal, would in many persons produce different forms of moist tetter. It must not be denied, however, that this does not much illustrate the origin of this disease.

The treatment is general or local, internal or external. The stomach and bowels require in the first instance to be cleansed and corrected, but without inducing purging. After this the administration of sulphur, either alone, or with nitre or cream of tartar, of polychrest salt, or Plummer's pill, or mercury with chalk in suitable doses will be useful. The natural or artificial sulphureous waters are very beneficial agents. Decoctions of sarsaparilla, bark with or without the fixed alkalies, are also beneficial in restoring general strength, and repairing the functions of the gastro-enteric mucous membrane.

Of local remedies, the mildest are the best. Carron oil should be used first, to soften the surface and facilitate removal of the crusts and scabs. Cream or almond emulsion is also used for the same purpose. A lotion prepared by boiling mallow, foxglove (*Digitalis purpurea*,) and poppy heads, is useful where the parts are raw and tender. When the discharge is considerable, the ointments prepared with oxide of zinc alone, or combined with saturnine ointment, or with the white precipitate of mercury, are efficacious in allaying pain, abating inflammation, and diminishing the discharge. When the parts are less tender, and the discharge less copious, the citrine oint-

ment, diluted with five or six parts of simple cerate, or with two parts of carron oil, makes a useful and effectual application. Any thing stronger or more irritating is generally injurious. In the drier forms of the disease, the Harrowgate waters, the warm sea-water bath, or even tepid bathing is the proper treatment. In the phagedenic form of the disease, remedies are useless; and all that can be done is to allay the pain and incessant irritation by judicious employment of opiates and narcotic applications, as opium, poppy decoction, hemlock, hemlock decoction or poultice, henbane, or the strong-scented lettuce.

§. V. Scall, Scalled-head, Ringworm of the Scalp. *Porrigo*.
Der Kopfgrind. La Teigne.

This disease consists in an eruption of straw-coloured pustules, pointed (*achores*,) or flat (*favi*,) without fever, and communicable by contact. The appearances which it assumes have been referred to six forms; the Masked-scald (*Porrigo larvalis*;) Branny-scald (*Porrigo furfurans*;) Lupine-scald (*Porrigo lupinosa*;) Ringworm of the Scalp (*Porrigo scutulata*;) Simple scald (*Porrigo deculvans*;) and Honeycomb-scald (*Porrigo favosa*.)

1. Mask-scald; Teigne muqueuse, Teigne de la face; (*Porrigo larvalis*, *Crusta lactea*.) Numerous minute whitish *achores*, close set on a red surface, appear first on the forehead and cheeks of infants, and spread by enlarging the patches. These soon break and discharge fluid, which hardens into thin yellow scabs, which, as the eruption continues, increase in thickness and extent, until they cover the brow, cheeks, and whole face, except the eyelids and nose, not unlike a mask. The discharge may be profuse, rendering the skin red and raw,—or scanty, leaving it covered with a dry brown scab. When it drops off and is not renewed, the exposed surface presents a red elevated tender cuticle, marked with deep lines, and exfoliating more than once. It does not crack, however, as in the moist tetter. The ears and scalp of the infant may be affected, and small patches may appear about the neck and breast, or even on the extremities. In general the health is not disordered, especially when the eruption does not appear in the early period of lactation; but it is always accompanied with considerable itching and irritation, which disturb sleep, impair digestion, and render the child weak and fretful. The eyes and eyelids may become inflamed; purulent discharges take place behind the

ears; and in some subjects the parotid, and subsequently the mesenteric, glands become affected. In these circumstances, wasting and hectic fever may at length terminate life.

More commonly, however, the disease, though tedious and uncertain, terminates favourably. It may disappear spontaneously soon after weaning, or after cutting the first teeth. Whatever excoriation may take place, no permanent deformity is left. According to Strack, if the urine of the patient retains its natural qualities, the disease will be tedious; but if it exhales an odour similar to the urine of cats, it indicates an early termination.

2. Branny Scall; *Teigne furfuracée*? of Alibert and Pinel. *Porrigo furfurans*.—Minute pointed pustules (*achores*) in the scalp of adults, especially females, discharging a small quantity of fluid, which soon hardens without much excoriation, into thin laminated scabs or scaly exfoliations. At irregular periods, pustules reappear, and the discharge being renewed, the eruption becomes moist; but it quickly dries and exfoliates. It is attended with itching and soreness of the scalp; and the hair, which partially falls off, becomes thin, less strong in texture, and lighter in colour. Occasionally the glands of the neck are swelled and painful. It must be distinguished from leprosy, dandriff, and scaly tetter.

3. Lupine Scall (*Porrigo lupinosa*.) Small separate clusters of *achores* on the scalp, where they acquire the size of a sixpence, discharging, on breaking, a fluid, which dries into yellowish white circular scabs, set deeply in the skin, with elevated edges, and a central depression, sometimes containing a white scaly powder resembling lupine-seeds. The intervening parts of the scalp may be covered with a thin white incrustation, which exfoliates; but if allowed to accumulate through inattention to cleanliness, it forms an elevated crustaceous cap. On the extremities, where the disease sometimes appears, the little white indented scabs do not exceed two lines in diameter. The lupine scall may increase if neglected, and is usually obstinate, tedious, and of long duration.

4. Ringworm of the scalp (*Porrigo scutulata*,) appears in distinct and distant patches of an irregularly circular shape, on the scalp, forehead, and neck. It commences with clusters of small light yellow pustules, which soon break and form thin scabs, which, if neglected, become thick and hard by accumu-

lation. If they are removed, the exposed surface is red, shining, and studded with slight elevations or pimples, in some of which minute globules of matter again appear in a few days. By repeated eruptions of these small pustules (*achores*) the incrustations become thicker, and the patches spreading may coalesce and affect the whole head. The hair at the same time becomes light-coloured, and sometimes breaks off short; and as the process of inflammation and scabbing is repeated, the roots of the hair are destroyed, until a narrow border only round the edge of the scalp is left uninjured.

This disease generally occurs in children of three or four years, and may continue for years. When the redness and ex-foliations disappear, and the hair begins to grow of its natural colour and texture, it may be expected to terminate.

5. Bald Scall (*Porriga decalvans*.) This variety of baldness, ranker than that of scall, consisting of circular patches of the scalp, smooth, shining, and remarkably white, utterly destitute of hair, is referred to this disease rather on presumptive than direct proof. It is supposed that the roots of the hairs may have been destroyed by an eruption of minute *achores*, which are not permanent, and discharge no fluid. The disease has been known to occur in a large assemblage of children, among whom other forms of scall were prevalent; in other instances, especially in adults, it has been observed to appear where no communication could be traced or conjectured. When once commenced, the bald patches may extend and coalesce, removing every particle of hair from the scalp, which continues in this condition for weeks, unless suitable means to remove it be employed. The new-growing hair is of a softer texture and lighter colour than the rest, and is gray in persons beyond the middle age.

Honeycomb Scall. (*Teigne Faveuse*, Alibert and Pinel. *Porriga favosa*. *Tinea favosa*.) Large soft straw-coloured pustules (*favi*,) somewhat flattened, with an irregular edge, and slight surrounding redness on the scalp, on the face, or on the trunk and extremities only; most commonly on the scalp, spreading from behind the ears to the face, or on the face spreading from the lips and chin to the scalp, or spreading from the extremities to the trunk. It is most common in children from six months to four years; but adults are not exempt from it. The pustules on the scalp are at first distinct, though close; on the face and extremities they generally rise in irregular clus-

ters, becoming confluent when broken, and discharging viscid matter, which gradually concretes into greenish or yellow semitransparent scabs. The disease extends, by the successive formation of new patches, over the chin, round the mouth, and to the cheeks and nose; and on the head it spreads over the whole scalp, matting the hair and scabs together by the discharge, and sometimes with the numerous generation of lice, to the great aggravation of the disease. The eruption is attended with considerable itching, in consequence of which the scabs of the face are incessantly forcibly removed, and the surface is kept red and sore; while the scabs are thickened into irregular masses, not unlike honeycomb, by the increased and concreting discharge. On the lower extremities considerable ulcerations may be formed, especially about the heels and roots of the toes, and in some cases at their extremities.

These ulcerating blotches generally cause much irritation to the lymphatic glands. While the scalp and face are affected, the glands of the neck become large and sometimes painful, and sometimes the submaxillary and parotid undergo like changes. At length some of them inflame, the skin becomes red, and slow suppuration takes place. Such subjects present discharges from the ears or from behind the auricle, blear eyes, and swollen upper lip. When the eruption affects the trunk or extremities, the glands of the arm-pit may be enlarged and painful.

The discharge from the ulcerated surfaces, especially on the scalp, when the crusts are removed, exhales an offensive rancid vapour, affecting not only the smell and taste, but the eyes of the observer. The acrimony of the discharge is also manifested by the redness, pustules, and ulceration which take place in sound skin frequently touched with it. In young children the breast is inoculated by the chin, and the hands and arms by the face; and the arm and breast of the nurse may be infected from the children; but adults are less susceptible of the disease than children.

This disease, though uncertain in duration, is more manageable than the ring-worm of the scalp (*P. scutulata*,) and the bald scall (*P. decalvans*.) Infants suffer much from the pain and irritation of the eruption, and the glandular affections which it generates; and those who are bred in large towns, and are ill fed and nursed, are sometimes reduced to fatal wasting; (*marasmus*.)

The treatment of scall-head is general or local.

General management consists in attention to the general health where it is impaired, and particularly to the condition of the secretions and excretions of the alimentary canal, where they are disordered. If the stomach present symptoms of acidity, flatulence, or imperfect digestion, soda, with or without precipitated sulphur, and testaceous or chalk powders, will be useful. If the belly be tumid and distended, the bowels slow and torpid, and their discharges very fetid, or of bad colour, aloetic laxatives should be employed, and small doses of calomel, or the cinereous oxide of mercury (*hydrargyrus cum creta*,) or Plummer's pill may be added. Afterwards decoction of bark, solution of tartrate or iron, or wine of iron, are the best remedies.

It is at the same time of infinite moment to regulate the diet properly. In most instances of scalled head, it will be found that the gastro-enteric mucous membrane has been deranged, and the duodenal and intestinal mucous follicles have been irritated, and perhaps excited to a state of chronic inflammation, by the use of food either excessive in quantity, or improper in quality. Thus large quantities of animal food, and of butter, cheese, pastry, and similar indigestible articles are often given to children, who become affected with this eruption; and the cutaneous affection appears to be merely a vicarious action induced by the morbid irritation excited in the gastro-enteric membrane and its follicles. To counteract the detrimental influence of the action now specified, it is requisite to withdraw the exciting causes, and prevent their operation. All articles of food containing butter or fat should be rigidly forbidden; cheese, fat meat, and even lean animal food should for a time be withdrawn; and the diet ought to be restricted to the use of the farinaceous grains, boiled or baked, with simple water and milk. Ground rice, arrow-root, rusk, biscuit baked with water, and similar articles are the safest; and even the farinaceous roots, as the potato, with milk, form a more salubrious article of diet than more nutritive materials.

This disease, however, does not always require much internal medicine, and the local treatment is, except in attention to regulation of the diet and the action of the bowels, which ought never to be omitted in children, the most requisite and efficacious. When the scalp is affected, shaving or otherwise removing the

hair is indispensable, both to the comfort of the patient and the success of applications. The parts, if raw and sore, must be washed two or three times daily with tepid milk and water, decoction of bran, soft soap, and water, or soap made without rosin.* Any mild astringent ointment, as the zinc, either alone or combined with saturnine ointment, or the calamine ointment, may then be used. The carron oil also, either alone or with a fourth part of citron ointment, is useful. In more obstinate forms of the disease, as the branny, the powder of moonseed (*Menispermum Cocculus*, L. *Cocculus suberosus*, Decandolle,) may be applied in ointment according to the formula. More stimulating applications are the citron, (*unguentum hydrargyri nitrati*,) the nitric oxide ointment (*unguentum hydrargyri nitrici oxydi*,) the tar, the sulphur, or the nitrous acid ointment.

Lotions in this disease are of two kinds, the simple astringent and sedative, as that of white vitriol, sugar of lead, the black wash, poppy heads, tobacco, stavesacre, &c. and the stimulant, as blue vitriol (*Sulphas cupri*,) corrosive sublimate (bichloride of mercury,) or lunar caustic (nitrate of silver.) The choice of these remedies must be regulated by the particular circumstances and degree of the disease.

An oiled silk cap should be worn over the scalp, in order to preserve it moist; by retaining the applications in contact with it much pain and smarting is thus avoided.

In an eruption of *favose* pustules on the face, ears, neck, and bare head, incident to adults, and attended with headach, pain of stomach, loss of appetite, bound belly, and some fever, a cathartic followed by the calomel pill, or that of Dr Plummer, with any of the mild applications, are the appropriate treatment.

§. VI. Great Pock, or Pustule, (*Ecthyma*.) This consists in an eruption of red, hard, sore pustules (*phlyzacia*,) distinct, seldom numerous, without fever, and not contagious. It has been observed under three forms, the Ordinary Pock (*Ecthyma vulgare*,) the infantile (*E. Infantile*,) and the Dingy Pock (*E. luridum*.) The characters of each may be stated in the following manner.

1. Ordinary Pock (*Ecthyma vulgare*.) A partial eruption of small hard pustules on the extremities, neck or shoulders, com-

* The brown soap, which contains a considerable quantity of this substance, and is acrid and irritating, must not be used. Palm soap, Windsor soap, or the vegetable soap, as it is named, are best.

pleted in three or four days ; in three days more they enlarge and become red and sore at the base, forming matter at the apex, which after a day or two is discharged and followed by a thinner fluid, which hardens into a brown scab ; in a week more the soreness and inflammation subside, and the scabs soon drop off, leaving no permanent mark. This eruption is generally connected with loss of appetite, irregularity of the alvine discharges, pains in the stomach and limbs, and other marks of general languor and constitutional disorder. It occurs in children sometimes, more frequently in young persons, in spring or summer after being overheated, fatigued, or in consequence of disturbing the digestive organs with improper food. Though the constitutional derangement is not relieved by the eruption, it ceases before the eruption disappears. It is, on the whole, symptomatic of constitutional disorder.

2. Infantile Pock (*Ecthyma infantum*.) Hard red pustules like those of the last occurring in weakly infants during suckling, when insufficiently nourished. The pustules are more extensive than in the ordinary pock, and rise in succession not only in the trunk and extremities, but on the scalp and face, which in the other forms of great pock is exempt from eruption. It thus may continue for months, during which the patient is free from fever, but suffers from the pain and irritation if the pustules become large, hard, and red, and suppurate to any depth ; when they leave a slight whitish depressed scar.

3. Dingy Pock (*Ecthyma luridum*.) Large pustules with a hard elevated dark-red base, arising successively over the whole person except the face,—occurring in those advanced in life whose constitutions have been impaired by hard labour, intemperance in the use of spirits, and night-watching. In eight or ten days after their first appearance, the pustules break, and discharge a curdly, sanious, or bloody fluid ; the cavities thus formed are soon filled with hard dark scabs, and are surrounded with deep-seated hard red borders, for several weeks or months, until the scabs separate. They are firmly fixed, and if removed forcibly, are not speedily reproduced, but may terminate in tedious, ill-conditioned ulcers, with callous edges, and a sanious discharge.

A symptomatic pock (*Ecthyma cachecticum*.) analogous to this, sometimes appears during the languid and imperfect health which succeeds measles, scarlet fever, or small-pox. Large hard red pustules arise in various parts of the trunk and extre-

mities, undergo the same changes, sometimes sloughing, and continuing inflamed after scabbing. It may continue from one to two months with hectic fever, laborious breathing, and swelling of the glands; yet the majority of patients struggle through it. Is the chronic boil of authors not to be occasionally referred to this head? In the treatment of this disease all that can be done is to administer the decoction of Peruvian bark, or any other tonic, to attend to the functions of the alimentary canal, and to employ the warm bath occasionally. In the infantile pock a good nurse is the first requisite; after this suitable clothing, exercise, and, if necessary, bark and the chalybeates.

SECTION VII.

Cutaneous inflammations originating in the substance of the corion, sometimes at the bulbs of the hair, terminating in partial or imperfect suppuration, with formation of scales, crusts, and occasionally sloughs, and more or less destruction of the corial tissue.

The pathological reader may perceive that the last disease, which came under consideration, forms a preparatory step to the examination of those which form the subject of the present section. The hard phlyzacious pustules, by which it is distinguished, manifestly denote a more complete affection of the corial substance than is known to take place in any previous cutaneous inflammation; while the slow, crude, and imperfect solution which they undergo, and the discharge of a blood-coloured rather than a purulent fluid, indicate a variety of the inflammatory process differing considerably from those already examined, and approaching to others which their characters show to be referable to a distinct head. The transition, therefore, if not insensible, is at least natural, to a tribe of diseases in which the general character is inflammation of the corion. These again are modified in such manner, that the same process, in different circumstances, gives rise to considerable variety of results; or, in plain terms, the same process slightly modified gives the several affections of the skin which it is now my purpose to examine. In the present state of knowledge it is perhaps difficult to enumerate all the agents or circumstances which may thus modify the simple process of corial inflammation. But the facts hitherto ascertained, and the observations which I have been enabled to make, lead me to say, that at present they may be referred either to the duration of the in-

flammation, to its circumscription, or, finally, to a difference of kind.

1. The influence of duration is observed in the comparative difference of the progress of the common bile or boil, which is rapid, and that of the whelk (*acne*,) canker (*lupus*,) and yaw (*framboesia*,) which are comparatively slow and tedious.

2. The influence of circumscription or diffusion may be easily understood. Many facts show that inflammation of the substance of the corion may be confined to a single point, or may spread to some extent. In the whelk (*acne*) for example, and even in the boil (*furunculus*) the inflammatory process is confined to a point; in carbuncle, on the other hand, it affects a great extent of corion through its entire thickness.

3. Whether the inflammation of the corial substance is different in one disease from what it is in another, we have no positive means of ascertaining. Though various facts indicate something of this nature, little is known to justify positive conclusions. The several pathological distinctions, to which I allude, will be most easily and clearly understood in the history of the phenomena of each disease; to which, therefore, I proceed, taking, first, those which are quickest in progress and shortest in duration, and the more slow and tedious afterwards.

§. I. Bile, Boil. Furuncle; *Clou*; *Furoncle*. *Furunculus*. Il Cicione, Furoncolo; Die Beule.

Eight Chirurgical Treatises, &c. by Richard Wiseman, in 2 vols. London, 1734.

—Principles of Surgery, by John Pearson, F. R. S., London, 1808, a new edit. 8vo. Chap. ii. p. 70.

1. The word Bile is of Saxon origin, and is used by many of our older writers to designate a small, hot, painful swelling of the skin. The term used by the modern Germans in the same signification, though differently written, has nearly the same pronunciation; and is evidently sprung from the same, or at least a common, source. Modern usage, at least among authors, has substituted the term boil, as more correct, on what principle, perhaps, it is not easy to say, unless it were the idea, that the morbid action which it was intended to denote was originally denominated from the verb. Johnson, our principal etymological authority, adheres in his dictionary to the ancient spelling.

The bile or boil is a hard, circumscribed conical swelling in

the skin, seldom exceeding the size of a pigeon's egg, with a broad deep-set stool or base, and a top (*apex*,) not much pointed, and but slightly raised above the level of the contiguous skin. It commences in the form of a round hard knot on the skin, which is painful, hot, and throbbing, and of a dull or bluish-red colour. In a day or two this hard knot spreads, and appears to penetrate more deeply with increase of heat and pain, and considerable tension of the neighbouring skin. About the fifth or sixth day, it generally has attained its greatest size, is then conical with a broad flat stool, and presents at top a whitish or bluish-white pustule, which on close examination consists of thin cuticle, covering a small quantity of purulent matter. The surrounding skin of the boil is generally bluish-red, and terminates insensibly in the natural colour. In other instances, this change does not take place till about the eighth or ninth day, (Wiseman.) But at whatever time it occurs, the matter formed is thick, curdly, and mixed with blood and solid matters, which are said to be sloughs. Whether this be discharged spontaneously or by art, the hard swelling and superficial redness still continue for a day or two, during which more bloody matter and slough may be discharged from the tumour. When this is accomplished, the pain, redness, and swelling gradually diminish and finally disappear, leaving the skin slightly discoloured, and a small hard scar for some time.

This is the ordinary course of what may be called the acute or common boil, the duration of which is from eight days to three weeks in different subjects. In the young and robust its duration is short and its course quick; in old, bloated, or otherwise unhealthy persons, it may last for weeks. Some authors, as Munnicks and Pearson, mention a chronic boil, which may continue for three, four, or five weeks. It differs in no other respect from the one which we have now described.

A species of symptomatic boil is produced by the presence of the Guinea worm.

The boil may take place in subjects of every age and both sexes, and on almost any part of the body. On the extremities, especially the legs, it is not uncommon to hear their formation ascribed to the forcible extraction of a hair. This, however, is not so common a cause of furuncle as the death of one of the piliparous sacs. It is generally solitary; but in some subjects one succeeds another, or two or more appear shortly after each

other. The latter is the habitual boil (*Furunculus habitualis*) of Frank.

The phenomena now described depend on acute inflammation of the corion confined to a certain spot. Pearson admits that the seat of the disease is the skin, but afterwards, by saying that it may occur in any part which abounds with cellular membrane, compels us to the alternative, either that the skin contains this substance abundantly, or that boils may occur in many other tissues. Boyer, by placing its seat in the cellular tissue, confounds it with phlegmon. The opinion of Bichat differs from either, but partakes of both. This anatomist asserted that the corion was penetrated with a great quantity of cellular tissue, which filled up its *areolae*, and was the exclusive and peculiar seat of the boil. The truth of this opinion depends on the nature of the idea attached to the term *cellular tissue*. If this name be applied to the loose fatty matter with its crossing threads which is found at the inner surface of the corion, and on which the corion rests; the opinion of Bichat is not very remote from the truth. This, however, I regard as the proper subcutaneous adipose tissue; and though I do not deny that the inflammatory action of the boil may descend to this, I do not perceive that it is thus proved either that the corion contains cellular tissue, or that this is the seat of boil. This is not the place to enter on any controverted subjects relating to the intimate structure of the animal body. But I am of opinion that the phenomena of this disease, and especially its termination, show, that it consists at first of circumscribed inflammation of the corial substance, which very soon, but only slightly, affects the subjacent adipose membrane. If this membrane were much affected, it would suppurate extensively, as in common abscess. On the contrary, the defined knotty tumour with which the complaint begins, the minute pustule to which it gives rise, and the imperfect and tardy suppuration, with formation of sloughs, and the perforated appearance of the skin, in which it terminates, indicate the furuncular inflammation to be seated in the corion, perhaps round a dead piliparous sac, or sebaceous follicle, which seems then to form the *ventriculus* of Celsus, the *head* of the Italian surgeons, and the *Core* of the English.

2. Authors, both systematic and practical, have mentioned two forms of inflammation named *Epinyctis* and *Terminthus*, which are generally regarded as closely allied to the boil. I know

not that they can well be distinguished, either in pathological characters, or in practical importance ; for, as the disease is of rare occurrence, few opportunities of studying its characters occur. According to Celsus the *Epinyctis*, which was so named from rising generally in the night-time, was a very bad pustule, appearing chiefly on the prominent parts of the person, and rarely larger than a bean. It was sublivid, blackish, or it might be white in colour, encircled with a red intensely inflamed circle, and more painful than its size would lead to expect. When opened, its interior was found to be a mucous exulceration, the colour of which resembles that of the fluid. (Lib. v. 15.) The leading features of this description have been copied by Aetius, Severinus, Sennert, La Riviere, and Forest. Wiseman represents both of them as a couple of angry pustules affecting the skin in the arms, hands, and thighs, differing little from each other, and therefore to be noticed together.

“ The *Epinyctis* is of the bigness of a lupin, of a dusky red, and sometimes of a livid and pale colour, with great inflammation and pain. It dischargeth first a sanies, then a bloody matter. *Terminthus* is somewhat less, of a blackish colour; it breaks and gleans, and within a day or two the pustules separate and come away in a slough, and from that time it digests and heals.”

According to Strack, to whom we are indebted for the best account of the *Epinyctis*, Nachtsbrand, or Night Boil, it always appears during the night, either with or without previous illness. In those who present the preliminary disorder, the limbs are the seat of a sense of uneasiness, and the whole body is torpid; the countenance is pale and haggard, the cheeks shrunk, and the eyes dull and hollow. Food is loathed, the breathing is languid, and the pulse, though regular, is small, feeble, and frequent. No distinct sensation, either of shivering or of heat, however, is felt.

After these symptoms, which constitute the stage of incubation, have continued for a few days, the patient finds in the morning, upon some part of the person, one or more pustules, accompanied with a hot searing sensation, as if the part was actually burnt. This constitutes the eruptive stage.

These pustules may either occupy a single spot cohering together, or may be dispersed in various parts. In the former case, as happened in four of the patients seen by Strack, the patch was five or six inches long by four broad, of a deep-red colour

throughout, and in this were many pustules, not larger than a lentil, filled with thin fluid, as if the part had been burnt. In most of them the fluid is colourless, but mingled with these are others of sublivid or livid tint, derived chiefly from the colour of the subjacent skin.

As this red colour partly subsides, white intervals are left in the skin, and the margin (*limbus*) only of each pustule remains red. At the same time the pustules originally sublivid become livid, and those which were livid become black. The pustules then bursting the fluid escapes, and the cuticle becomes flaccid, adheres to the surface of the skin, forming a scab which is then separated. The sense of heat, meanwhile, in the margin of the black pustules and the pain are increased, and fever ensues, with suppuration, which detaches the diseased from the sound skin, and leaves a depressed scar or pit, similar to those left after small-pox; and this completes the course of the night boil with coherent or confluent pustules. This process consists of an inflammatory and a suppurative or exfoliating stage.

When the pustules were distinct and scattered, as Strack observed them in eight cases, they were blackish, and when the pustule was opened and its contents emptied, the subjacent skin, to which it adhered, was also blackish; and both afterwards dried into a black-coloured hard mass, exactly as if the part had been there burnt by the glowing iron. A little after, a red circle appeared in the sound skin around this eschar, acquired a deeper colour and became hot, and suppurative inflammation completed the process of detachment, leaving in like manner a deep scar or pit. These distinct pustules were also larger than in the coherent form of the disease, being the breadth of a lentil or pea, and seldom larger than a bean. In one woman, however, they were larger than a nutmeg.

In general, the night boil arises in a part of the skin which is tender and delicate, never from a dense portion. In ten patients the pustules were in the loins or belly, or towards the pubal region; in two, they were in the breast and neck; and in nine did they appear in the back, the arms, or legs.

The eruption preserved the same character in persons in good health, and in those in whom it had been long impaired. Night boils appeared in five infants in good health; in one woman who was labouring under tertian ague; in a virgin who mens-

truated regularly; in another who was suffering under latent cancer of the breast; in one man who was suspected to suffer from gout and the effects of the syphilitic poison; in an old man who was tympanitic, and suffered under gouty colic; in a woman of seventy years, who had open cancer of the *mamma*; lastly, in a female without particular disorder, but in a season when attacks of catarrh, ophthalmy, lippitude, eruptions round the lips, small-pox and measles, scarlet fever, rose, and gangrene were common.

As in all these different cases, the *epinyctis* presented the same characters, he conceives that it depends on the operation of a peculiar miasm.

It was further impossible to trace any connection between the state of health of the individuals attacked, and the part of the body in which the night boils appeared. In the five infants they appeared on the belly, and near the pubal region. In the individual suspected to be tainted by the syphilitic poison, they broke out at a distance from the generative organs. In the case of the virgin with latent cancer, they broke out in the renal region. In the old person with gouty colic and tympany, the belly escaped, and they occupied the breast and neck; and in the old female with open cancer, all the pustules appeared on the same side of the body. *

This disease bears some resemblance to that which has been described under the name of *Burnt Holes*, by Dr Tuomy of Dublin. †

The disease is supposed by Strack to depend upon the operation of some peculiar poison of a gangrenous character (*miasma sphacelosum*.) It can scarcely be doubted that its presence indicates the operation of some very disordered state of the circulation and nutrition.

Of the *Terminthus*, no accurate account is given. But it seems to be either a mere variety of the *Epinyctis*, or a species of *pemphigus*; with gangrenous tendency.

The treatment required by boil and *Epinyctis* is general and local.

In many constitutions, boil is merely a natural effort to relieve some of the functions by a peculiar inflammation of the

* Caroli Strack, Prof. Med. Mogunt. Dissertatio de Epinyctide. Moguntiae, 1776. Frank Delect. xii.

† A Treatise on the Principal Diseases of Dublin, by Martin Tuomy, M. D., T. C. D. Dublin, 1810; p. 350.

skin; and, under such circumstances, little else is required, except local treatment by means of the emollient poultice, then an incision, and ultimately light dressing with the resinous ointment, or any other of the mild digestive applications. A dose of purgative medicine, as three or four of the colocynth pills, or a dose of the saline infusion of senna, may be useful.

In other instances, however, and in all the cases of *epinyctis*, it is generally expedient and often necessary to rectify the state of the alimentary function, and to improve the circulation and secretions of the mucous surfaces, and of the skin. In some instances, it is proper to exhibit an emetic at the commencement, and in all it is indispensable to clear out the intestinal tube, by means of efficient eccoprotics, the selection of which will be easily understood.

After this has been done, it is proper to exhibit medicines, consisting of tonic, laxative, and antacid remedies; and I know none better than the compound alkaline infusion of senna and gentian, which consists of equal parts of infusion of senna, and infusion of gentian, and as much liquor of potass as makes from thirty to forty drops in each wineglassful. In some instances, the place of the liquor of potass may be supplied by nitrate of potass, in doses of from five to ten grains.

To improve the skin, the warm bath and frequent washing with soap is the best remedy.

The local applications are light poultices, fomentations with poppy capsule decoction, or hemlock stems, and afterwards the resinous or the elemi ointment.

§. II. Carbuncle, Cutaneous Carbuncle. *Anthrax*; *Carbo*; *Carbunculus*. Il Carbonchio; Carboncello; Antrace.

Chirurgical Observations and Cases by William Bromfield, Vol. i. London, 1773. Chapter v. p. 118.

The formation of this disease is almost uniformly preceded by some constitutional disorder. Languor, listlessness, sickness, or loathing of food, with transient sensations of cold, or in some instances complete shivering, are succeeded by headach, thirst, general heat, and a pulse always quicker than natural. When these complaints have continued for a day or two, a small hard knotty swelling little elevated, but accompanied with great pain and burning, is perceived somewhere in the skin, generally on the back. At this time it presents the appearance of a phly-

zacious pustule, or incipient boil, but less prominent than either. The skin over it is dark or brown red, slightly glistening, more generally dull, and the colour, which does not readily disappear on pressure, becomes gradually less vivid, till it terminates in the sound skin. As the disease advances the swelling spreads, but is diffused; the red-brown colour of the first affected skin becomes darker; and the original tinge extends over a greater portion of skin. The cuticle at the same time is raised into minute watery blisters, dark red or purple, or is peeled off from the centre of the swelling; while the sense of painful burning or searing becomes more intense, and more extensive. When the disease proceeds with ordinary rapidity, these changes in the swelling and redness of the skin are observed on the third, fourth, or fifth day. About this time the centre of the tumour, or some contiguous part, becomes of a dirty black or leaden gray, is insensible if touched or punctured, and forms a doughy and inelastic mass, presenting the usual characters of dead or mortified skin. It may also happen that this change may take place in several points of the inflamed skin at the same time, and these coalescing form a central mass of considerable size. In either case, the size of the mortified skin will depend on the size of the swelling; its figure is irregular, and its edge more or less ragged, and in some instances it is perforated with irregular holes, through which dirty blood-coloured matter escapes. It appears in general very like a piece of skin or animal matter which has been seared with a hot iron or otherwise burnt; and this circumstance is the origin of the name of *coal* (*anthrax*; *carbo*) which has been applied to it in all languages, and in which state it has almost invariably been described by writers. I have preferred describing the progress of the disease from its commencement, as I have observed it in several well-marked examples. I have now to advert to its characters in this state, and to mention its subsequent progress.

The carbuncle, as it may in this condition be termed, is a broad flat swelling, deeply seated in the skin, hard and insensible in the centre, but hot, stiff, and painful at the circumference. It is said to be distinctly circumscribed, but this is not correct in the usual sense in which this qualification is understood. In several cases I have invariably found the swelling diffuse and extensive, not prominent, but spread over a great surface. The edge of this swelling is indeed sometimes circumscribed, but it is more

commonly indistinct, especially while the morbid action is still going on. If it can at any time be said to be circumscribed, it is when this action has stopped. The colour of the skin is dull red, inclining to purple, and in some parts it is livid. Its colour is most vivid at the outer margin of the tumour, where it is conterminous with the sound skin; and in general it is not marked with a distinct edge. The redness does not disappear on pressure, unless at the very edge of the swelling, where it sometimes becomes fainter when pressed. The pain of the swelling is hot and searing, as if the part was undergoing an actual combustion. When the central skin becomes dead, the pain is less severe, and is felt chiefly at the outside of the swelling.

The mortified slough varies in size, according to that of the carbuncle. I have seen one on the back, the diameter of which was five inches, and it is not uncommon to see these sloughs at least three inches in diameter. This dead skin has a soft, pasty or doughy sensation; while that which is still red is hard, firm, and sometimes œdematous. The slough appears often to be spread by its edge, or, in other words, the inflamed skin at its margin dies, and thus augments its extent. When a certain portion of skin has been thus killed the process stops, and a new one commences. Somewhere in the margin of the slough, separation takes place between it and the inflamed skin, and unless the mortifying process is renewed, this goes on till the whole dead skin is detached from the living, as in other instances of slough or eschar.

It sometimes happens that the orifices which I mentioned as forming in the skin during the early part of the disease enlarge, and thus separate the dead skin into two or more portions. In either case, or if the slough be divided by a deep incision, a considerable quantity of adipose membrane will be found below, of a dirty gray colour, not unlike wet tow, destitute of vessels, and, in short, entirely dead. This forms a second tissue, which is deprived of life in the process of carbunculous inflammation.

These form the chief local phenomena of carbuncle. During their progress the constitution of the patient is generally much disordered. He is sick, languid, and listless, yet restless, anxious, and can seldom sleep during the night. He generally suffers much headach and thirst, and his tongue is loaded with a thick, brown, dry fur. He generally loathes food, and in

some cases vomits more than once. The pulse is at the same time quick and small, sometimes much oppressed and languid. In severe cases the patient raves, especially during the night, and the general weakness is so great that fainting is not uncommon.

The duration of carbuncle varies in different subjects. Boyer states that the most severe, which he terms malignant, has caused death in infants and adults in forty-eight hours, while others have survived it eight or ten days. I have rarely seen a patient killed outright by it, but I have seen the disease in a severe form last three weeks, ere the mortifying process ceased; and in one instance of a large carbuncle on the back, it was computed that five weeks had elapsed from the first seizure to the time when the slough showed signs of separation.

The carbuncle may occur in any part of the cutaneous surface; but they are more common on the trunk than on the extremities, and more on the posterior than anterior surface of the body. Hunter, however, admits that he has seen them on the head, and sometimes, though seldom, on the extremities. I have rarely seen them, unless on the back, especially between the shoulders. It is rare in the young, and attacks in general those beyond middle age, few under it.

Hunter has remarked, that it is most common in those who have lived well, and that he never saw but one patient of this kind in an hospital. This is in great part contradicted by what has fallen under my own observation. I do not say that those in whom I have observed instances of carbuncle, did not invariably belong to that class of persons who are said to live well. But I have seen the disease occur in persons of two kinds; 1st, in those who are addicted either to a constant or intemperate use of distilled spirits, or even wine, when these habits have the effect of impairing health, and inducing a full bloated habit; 2d, in those whose food is sparing, or of inferior and innutritive quality, and who, at the same time, are exposed to extreme fatigue or occasional debauch. Abernethy, by showing that the appearance of carbuncle is often preceded by lasting disorder of the function of digestion, and thereby of the general health, has furnished the means of reconciling these apparent discrepancies. (P. 163.) The same effect may result from the operation of different or opposite causes; and the derangement of nutrition, which in the affluent is the effect of

intemperance, may in the indigent arise from poor, scanty, or improper food, taken at irregular periods. Corpulence seems often to dispose to the disorder; and perhaps the principal mode in which it does so, consists in the circumstance, that corpulent persons are often addicted to foul and excessive feeding. We also recognize in this disease an alliance with the inflammation of the adipose tissue. Hildenbrand states that a protracted use of sulphurous baths is liable to engender the disposition to carbuncle. I have seen carbuncles as frequently in women as in men, almost never in the upper ranks, where temperance in the use of wine or other liquors was observed, but often among the labouring classes, whose penury was extreme.

Both Hunter and Pearson have remarked that carbuncles are rarely solitary, and that not unfrequently they appear in different parts of the body at the same time, or one succeeds another, to the number of three, four, or five, rarely more. When the disease consists of a single tumour, it is generally large; and when there are more than one, the first is large, and the others are smaller.

We shall have occasion to see, in speaking of the Persian Fire, or Malignant Pustule, that one variety of carbuncle seems to be produced in the human body by the application of the fluids of animals, healthy or diseased; and perhaps some instances of sporadic carbuncle may in this country be traced to a similar cause.

A species of carbuncle, endemial or isolated, is ascribed by Pallas to the puncture or bite of an insect; and the opinion has been defended by Heirott, Hoff, and Rekmann. The principal reason for this opinion is, that the disease is most prevalent in hot summers, and rages most in marshy districts where insects abound.

Though I have placed the carbuncle here as an example of spreading inflammation of the substance of the corion, yet the question of its precise seat in the animal tissues is not entirely free from doubt or difficulty. Bromfield, who was the first that formed correct notions of its nature and seat, regarded it as a *spacelus* of the cellular membrane; and, as he agreed with William Hunter in distinguishing this from the adipose tissue, he is particular in specifying the former, as the seat of the disorder, as distinct from the latter.* A similar view was taken

* Chirurgical Observations and Cases, London, 1773, p. 92-96, and 123.

by John Hunter, who was of opinion that it consisted in inflammation and death of the cellular membrane only. His views may be given in his own words. "The inflammation that produces the carbuncle is of a different nature; it is stationary with respect to place, and is pretty much circumscribed, even forming a broad, flat, firm tumour. It begins in the skin almost like a pimple, and goes deeper and deeper, spreading with a broad base under the skin in the cellular membrane; and although considerably tumefied, yet this does not arise from the extravasation of coagulable lymph, producing adhesions which are to retain life; for the very cells into which it is extravasated become dead. It produces a suppuration, but not an abscess, somewhat similar to the erysipelatous, when the inflammation passes into the cellular membrane; for as there are no adhesions, the matter lies in the cells where it was formed, almost like water in an *anasarca*; but still it is not diffused through the uninflamed cellular membrane, as in the erysipelatous, for it appears to extend no farther than the inflammation. One would almost imagine that there was a limitation to the extent; beyond which, this species of inflammation could not go, and at these limits the adhesive inflammation took place to confine the matter within the bounds of the carbuncle. A diffused ulceration on the inside for the exit of the matter takes place, making a number of openings on the skin. As death is produced in a great deal of the cellular membrane, and I believe in it only, except the skin giving way, which I believe is by ulceration principally, it becomes a question, whether this mortification arises from the nature of the inflammation, or rather from the matter being confined in the cells of the latter cellular membrane? I rather suspect the latter; for I find that if this matter escapes from these cells and comes into uninflamed cells, it produces mortification there." *

We here see that Hunter believed it to be seated principally in the cellular membrane, which he represented to become mortified; with this Pearson agrees; Boyer regards it as seated in the teguments and subcutaneous cellular tissue; and Lassus represents it to occupy the substance of the skin and cellular tissue, the former of which is softened, and separates at the end of two or three days into minute fissures, while the latter forms the *nucleus* of the tumour, putrefies and falls into shreds,

* A Treatise on the Blood, by John Hunter, 4to, p. 273, Lond. 1794.

leaving at the bottom of the ulcer the muscles and tendons exposed. * Lastly, Monteggia, saying that it destroys a notable portion of the teguments and of the adipose and cellular substance down to the muscles, seems to regard it as a peculiar action, affecting several tissues simultaneously or successively. †

The statement of Hunter I was at one time disposed to regard as presenting a correct view of the pathology of carbuncle; and to think that Willan had gone on an erroneous principle in referring the seat of carbuncle to the skin. I have since, however, observed the progress of several carbuncles, from their origin to their termination. I have more than once had occasion to cut them open, and examined their morbid relations as carefully as it is possible to do in the living body; and I am satisfied that the opinion of Hunter is not correct, and that that of Willan is not entirely wrong. In several carbuncles which I have noticed from the beginning, the inflammatory action certainly commenced in the skin in the form of a hard knotty pustule; and this is in point of fact admitted by Hunter. If it was cut open at this time, which might be done not only with safety but with benefit, the skin or rather the corion was found to be thicker than natural, much redder, and more vascular; and these marks of inflammation not only pervaded the substance of the corion to a considerable extent, but the subcutaneous adipose membrane in a slighter degree. This inflammation of the adipose membrane spreads indeed along with that of the skin; but it also kills this tissue almost immediately, or at least very quickly gives it the usual appearances of mortified matter. At the same time the inflammation of the corion extends quickly, and very soon kills at least its exterior surface; and Hunter is inaccurate in saying that the skin does not die, but gives way by ulceration. The death of the corion is a very early effect of carbuncular inflammation; and though this does not preclude the formation of openings by ulceration, it may take place without them. According to my own observation, death takes place most generally in patches of the corion, which may afterwards burst as it were by distension; ulceration takes place at points which have not been killed, and in general at the union of the dead and living skin.

* *Pathologie Chirurgicale*, Tome i. Paris, 1809, p. 39, viii.

† *Instituzione Chirurgiche*, Vol. i. Milano, 1813, p. 178.

There is no ground for believing that the subcutaneous cellular membrane is killed by the confinement of matter in its cells. The ordinary mode in which this appears to take place, is by the spreading inflammation of the corion, extending along its lower surface, and producing death, as it appears to do in inflammation of the adipose membrane. Though, in short, the carbuncular inflammation commences in the *cutis vera*, it passes rapidly to, if it do not simultaneously affect, the adipose membrane; and as the vital power of this tissue appears to be moderate, and incapable of resisting the effects of inflammation so successfully as that of other tissues, its death is inevitable and almost immediate; and hence, when the tissue is cut open, it is common to find the adipose tissue destroyed to a much greater extent than the skin. The cellular tissue may be subsequently affected.

The fluid discharged in carbuncle is a dirty blood-coloured serum. A small quantity is generally formed at the outer or cuticular surface of the corion, which either raises the cuticle in phlyctenoid vesicles, or detaches it entirely, and continues to be discharged till the skin is quite dead. A much greater quantity is formed at its inner surface and along the cellular membrane, which either escapes through the ulcerated openings, or is discharged when the mortified skin gives way. It is sometimes mixed with blood.

Upon the whole, I think it may be concluded that the corion is primarily and principally the seat of disease in carbuncle, and that the affection of the adipose tissue and cellular membrane which uniformly accompanies it, is the effect of the spreading inflammation of the corial tissue.

The carbuncle which appears as an effect and symptom of plague has been considered when treating of that disease.

The treatment of carbuncle is general and local. The general treatment is regulated by the common principles of the treatment of fever. Full and prompt purging is of much benefit; and afterwards the bowels should be regulated by medicine and suitable diet. The local treatment, which is most important, consists in crucial incisions to discharge mortified adipose membrane and relax the skin, and facilitate the application of proper remedies, the emollient or carrot poultice, the resinous ointment, or the turpentine liniment,—and when the

sloughs are detached, the use of simple dressings and gentle compression.

§. III. Malignant or Carbuncular Pustule; Persian Fire; Nar al-Parsi; Atshac Pers. Giamrach, Arab. *Ignis Persicus*, John of Gaddesden. *Anthracion*, *Anthrax Septicus*; *Pruna*; *Pustula Maligna*. Pustule Maligne; Bouton Maligne; Puce maligne, French. *Mal-Vat*; *Mal a Butin*, Provençal. Die Brandbeule; Die Schwarze Blatter. Czarna Krosta; Slav. Powietrzna chrosta; Polon.

Fournier, Observations et Experiences sur le charbon malin, Dijon, 1769.—Tomasin; Dissert. sur le charbon malin de Bourgogne ou la pustule maligne, Dijon, 1780, second edition, Basle, 1782.—Chabert, Traité du Charbon ou Anthrax dans les Animaux. Paris, 1779, 1780, and 1782.—Saucerotte, Essai sur la Pustule Maligne, &c. Dijon, 1780, in Melanges de Chirurgie, Paris, 1801, p. 428.—Chambon, Traité de l'Anthrax, ou de la Pustule Maligne, Paris, 1781, et Encyclopedie Method. Med. Tom. iii Paris, 1790. Art. Anthrax.—Enaux et Chaussier, Methode de traiter les Morsures des Animaux enragés, et de la Vipere; suivie d'un precis sur la Pustule Maligne, a Dijon, 1785.—Suite des Observations Medico-Chirurgicales de M. Dussaussoi, Chirurgien en Chef de l'Hotel-Dieu de Lyon. Du charbon.—Journal de Medecine, etc. Octob. 1786. Tome lxi. p. 12.—Fourcroy, La Medecine éclairée par les Sciences Physiques, Paris, 1791. Vol. i. p. 118, p. 343, Vol. ii. p. 155.—Vincentii Malacarne, de Febre Carbunculosa deque Carbone bovillo Disceptationes Academicæ binæ in Archigymnasio Patavino, anno 1797 habitæ. Brera Sylloge, Tome iii. Ticini, 1799.—Gerardin, Dissert. sur la Pustule Maligne, Paris, 1806.—Kausch, Die in Königreich Preussen und besonders im Herzogthum Warschau, endemische sogenannte Schwarze Blatter, als Folge des Milzbrandes. Hufeland and Himly, Journal des Practischen Heilkunde, vi. B. 1811. September, p. 68, and October, p. 49.—Hopf, Beobachtungen und Bemerkungen uber die so gennante Schwarze Blatterkrankheit, Altenburg, 1812.—Kopp, Jahrbuch der Staatsarzneykunde. Fünfter und Sechster Jahrgang, 1813.

In various districts of the south of France, in Prussia and the Grand Duchy of Warsaw, certain classes of the inhabitants are liable to be attacked during particular seasons, with vesiculo-pustular inflammation of the skin, accompanied with symptoms of great febrile disorder, assuming speedily a gangrenous character, and proceeding in general with great rapidity to the fatal termination.

It is recorded by Pliny, that a species of carbuncle represented to be peculiar to the Province of *Gallia Narbonensis* appeared first in Italy, in the censorship of S. Paullus and Q. Martius, corresponding to the seventy-seventh year of the Christian era, and proved fatal to two persons of consular rank, Julius Rufus and Q. Lecanius Bassus. According to Pliny, this carbuncular disease appeared in the most secret parts of the body, generally under the tongue, in the form of a small red,

hard pustule, or tubercle (*varus*,) with a black apex, at other times bluish,—without swelling, pain, or itchiness, or any other indication, except occasional shivering and oppressive drowsiness, by which the patient was destroyed in the course of three days.* It is an important circumstance in this notice, that the disease appears at this early period to have been regarded as endemial in that part of France, where modern experience has shown it is so prevalent.

I. This disease, which is supposed to be the same as that described in the eleventh century, by Abu-Ali-Ibn-Tsina, under the name of *Nar-al-Parsi* or Persian Fire, and afterwards by John of Gaddesden, under the name of *Ignis Persicus*, as distinct from the common carbuncle, in beginning like the bite of an insect, and proceeding much more rapidly, is known in France under the name of Malignant Pustule (*Bouton Malin*,) or malignant flea-bite (*Puce Maligne*,) from the manner of its first appearance, and in the Provençal *patois*, under the names of *mal-vut* and *mal a butin*.

It begins at first like a minute puncture or gnat-bite, with a sense of unpleasant but slight itching, or smart but transitory pricking, without heat, redness, or tension of the skin. These symptoms are, indeed, often so slight and imperceptible, that it is only after repeated observations that the commencement of the disease can be recognized. The cuticle is gradually detached in the form of a serous vesicle, which is at first not larger than a millet seed but gradually increases, and assumes at the same time a brownish colour. The itching sensation, meanwhile, returns from time to time; and the patient instinctively scratches, and without perceiving it, breaks the vesicle, which conceals the source of the disorder, while a few drops of reddish serous fluid escape, and stop the itching for an hour or two. This period, distinguished by the sensation of itching or pricking with the formation of the vesicle, may continue from twenty to twenty-four or thirty-six hours, and may be regarded as the first stage of the disease. It is rarely, at this time, attended with conspicuous febrile symptoms.

Soon after this, though it is impossible for the superficial observer to distinguish any change in the colour of the skin, the experienced eye perceives in the centre, and beneath the first vesicle, a citron-yellow, livid, or mottled tint, and he recognizes in the substance of the skin a small hard, movable, circum-

* C. Plinii, *Historiae Naturalis*, Lib. xxvi. Cap. iv.

scribed, flattened tumour, ordinarily of the size and shape of a lentil. The itching sensations, meanwhile, return more frequently, more intensely, and with greater uneasiness, and they are associated with a sense of searing heat and erosion. The cutaneous tissue then swells, and its surface is tense and glistening; and round the central point is formed a second swelling, softer, more superficial, forming a ring, variable in breadth and prominence, sometimes pale, sometimes reddish or livid, sometimes orange-coloured or marbled, presenting small *phlyctænæ* or blisters, which are at first isolated, but which ultimately coalesce, and are filled with a reddish acrid serous fluid.

At this period, when the malignant character of the disease is unequivocal, patients become apprehensive and alarmed, and request assistance. The central tubercle forming the primary tumour becomes brownish, very hard and insensible, forming a gangrenous point, which all at once enlarges anew. This second stage distinguished by the presence of the tubercle (*varus*,) the vesicular or phlyctenoid ring (*areola*,) and the continuance of the itching prickings, lasts sometimes several days, but more frequently only a few hours. Its phenomena depend on affection of the outer surface, and of the substance of the *cutis vera* at the same time.

The progress of the disease is now rapid, tumultuous, and alarming. At first, the centre of the tumour becomes harder, deeper, and entirely black with progressive extension of the gangrenous eschar. The surrounding vesicular ring, which announces and precedes the mortification, gradually enlarges in breadth; sometimes it is elevated, and forms round the original *nucleus* a sort of border, which makes the former appear depressed; but the *areola* in its progress becomes deeper, being no longer confined to the surface of the skin as at first, and forms round the first tumour a second compact tumour, which, however, is softer and still sensible. There ensues at the same time a considerable swelling, extending often to a distance, with a peculiar character important to be understood, neither inflammatory, nor oedematous, but more allied to meteorismus and erysipelatous swelling. The whole affected part is swelled, tense, and rigid; the cellular tissue appears to be distended with air and viscid fluids; the surface of the skin is glistening; the swelling is elastic and resisting; and the patient, after feeling a sense of burning heat, or searing pain, experiences at this stage only

a feeling of numbness, strangulation and weight, in the part. The original tumour appears to be the centre from which the morbid action is gradually propagated in all directions. While the centre is entirely sphacelated, the surrounding parts appear still sound, and yet they are tending to mortification ; and while the skin forms a superficial crust, the mortification glides insensibly along the adipose tissue, and destroys whatever it meets in its course.

This third period, distinguished by the increase of all the local phenomena, and especially by the tension and elastic resisting swelling of the part, continues a longer or shorter time, according to circumstances presently to be noticed. In general in a strong robust person, in whom methodical treatment has been commenced early, this period may last from four to five days. The disease is at first arrested. The swelling loses gradually the tension and emphysematous infiltration, which distinguished the stage of erethism and irritation. The vesicular areola assumes a more vivid red-colour, indicative of true inflammation. The patient feels a gentle heat and re-iterated throbbing motions. The gangrene is limited ; the tumour is surrounded by a red circle ; copious suppuration in the adipose tissue ensues, and detaches the slough, and thus terminates the disease. But in feeble delicate persons, in whom the natural vital powers are inadequate, or oppressed by an improper method of treatment, the disease makes rapid progress, and passes almost immediately to the fourth stage, which forms an internal disease of greater or less severity.

According to Enaux and Chaussier, it is only at this fourth stage, when the disease has already affected the skin and adipose tissue, that febrile symptoms ensue. There is reason to believe, however, that this representation is erroneous. Even during the first stage there may be slight sensations of chillness ; and always when the areola is forming, the pulse is small and quick, the patient loathes food and is thirsty, and feels his strength and functions oppressed by an irresistible sense of languor and feebleness. But if these symptoms of general disorder do not appear at the first, with the formation of the areola, and the beginning of the general tumefaction of the part, they never fail to ensue very rapidly, as soon as the latter symptom is fully proceeding. These symptoms may vary in different individuals, and at different seasons ; but they in general par-

take much of the character of the phenomena of *Synochus*, or malignant nervous fever (*Typhus*.) The pulse is small and oppressed, rarely hard, sometimes soft, often variable, always frequent, and increasing in frequency. The skin is dry; the tongue parched, and covered with a rough brownish fur. Though the heat appears inconsiderable, the patient feels himself consumed by an internal sense of heat, which causes unquenchable thirst. He is feeble and anxious, and suffers from a painful sense of uneasiness at the epigastric region. Sometimes he complains of acute pains; at other times the respiration is short, and interrupted by sobs and sighs, and often unsteady and irregular in its motions. The memory is impaired, and the patient, forgetting where he is, speaks incoherently; while a degree of stupor and insensibility to external impressions, being mingled with the delirium, causes a state, which, though to a casual observer resembling sleep, is indeed *typhomania*, or *coma vigil*. In this state the secretions are not remarkably affected. There are rarely colliquative sweats, diarrhœa, or hemorrhages; but the urine is scanty, thick, and brick-coloured.

Meanwhile the symptoms of the local disorder are most intense. The swelling becomes enormous; the mortifications penetrate to a great depth; the fluids of the adipose and cellular tissue become putrid; and the patient, already exhaling a peculiar gangrenous odour, expires in a state of coma, and putrefies rapidly.

II. MODIFICATIONS AND COMPLICATIONS.—The account now given communicates a view of the progress and phenomena of the malignant or carbuncular pustule in ordinary circumstances. These phenomena may vary in different individuals, and at different seasons, in their intensity, in the rapidity of progress and mode of termination. Though the four periods now specified are in general observed without much difficulty, in some instances they pass into each other insensibly, and proceed so rapidly, that the patients are cut off in eighteen or twenty-four hours. In other cases the disease observes a slower course, and, after lasting twelve or fifteen days, terminates spontaneously by the efforts of the constitution.

In strong vigorous subjects of the sanguine temperament, the malignant pustule runs its two first stages with great and uniform rapidity; but it may be arrested at the commencement of the third. The slough is dry and compact, rarely broad and

deep. The swelling of the adipose tissue is moderate, being firm without hardness, and pliant without softness. The vesicular *areola* is not prominent; it preserves its temperature and vital tone. The colour is of a brighter red in the vicinity of the central pustule, and gradually diminishes towards the circumference. Suppuration is established with facility, and internal symptoms either do not ensue, or are slight and transitory. Lastly, the disease is peculiar, in presenting less of the gangrenous tendency, and more of the character of true inflammation.

In persons of the melancholic temperament, with dry dense fibre, constitutional symptoms ensue much more rapidly. The heat is more pungent; the itching sensations more intense; the swelling of the adipose tissue is more compact and resisting; the vesicular *areola* is broader and marbled with various colours; and, in short, the disease partakes more of the erysipelatous character. This species appears most frequently on mature age.

In patients with soft lax fibre and abundant serous fluids, the febrile symptoms, though less rapid at first, are often more severe ultimately. The swelling of the adipose tissue is more extensive; the vesicular *areola* is broad, pale, and livid; the slough, which is soft, extends rapidly, and penetrates deep, and sometimes forms a prominent ring in the integuments. The suppuration is serous in character, and is established slowly. In short, the symptoms betray the cedematous character. This variety of carbuncular pustule is observed most frequently in females, in old men, and in parts in which the adipose tissue is loose and abundant.

In feeble subjects, and those disposed to solution of the blood, and in whom the villous membrane of the alimentary canal is loaded with viscid mucus, with retardation, if not derangement of the circulation, the disease is more complicated, and assumes a more formidable aspect. Sometimes, at first, the local swelling is extreme; in other instances, the disease passes slowly through its first stages, and all at once its malignant character is developed with singular violence. The vesicular *areola* is sometimes of a livid leaden colour like that of an ecchymosis; sometimes of a bright-red, but always disposed to mortification. The slough is soft but deep, and upon dividing it, the blood flows profusely, and is stemmed with difficulty. The neigh-

bouring parts, which seem to retain a trace of vital action, are moistened with ichorous serous fluid. In cases of this class, the malignant pustule is sometimes succeeded by a genuine carbuncle, which forms on the part already affected, or in its vicinity. This irritation aggravates the intensity of the action or perverted action. The gangrene extends, is observed to be increased at each dressing, and is arrested with difficulty; and when its limits are fixed, the suppuration is profuse and serous, the parts are soft, pale, or bleeding, and the process of cicatrization is long and difficult in completion.

In pregnant females, and those in whom pregnancy is oppressive, near their term, malignant pustule is always dangerous. Often it causes premature parturition, and it may be fatal, if much hemorrhage ensue.

Malignant pustule, though liable to affect any part of the body, usually attacks those which are habitually exposed, as the face, neck, chest, hands, rather than other parts of the body.* Those in the head and face are more troublesome than those in any other part of the body. A pustule in the eyelids is very painful, causes great swelling of the whole face, closure of the eye, often deep-seated pain of the head with delirium; and afterwards, the cicatrix is accompanied with eversion of the eyelid, and habitual and incurable lacrymation (*epiphora*.) In general where the adipose tissue is loose, soft, and abundant, the symptoms are severe in degree, and rapid in progress, with extensive swelling, a deep slough, and difficult and tedious suppuration; and conversely, where the adipose tissue is scanty, and the skin is connected with muscles, the disease is comparatively mild and easily checked. On the chin, lips, and tip of the nose,—in short, in parts where the muscular fibres are blended with the skin, the disease does not penetrate deep, and is easily limited. The muscles seem to form a natural barrier to the progress of the gangrenous inflammation.

At the temple Malignant Pustule causes swelling and painful tension, often with the erysipelatous character, extending to the face and scalp. On the cheek the swelling spreads along the neck, and penetrates into the mouth, where it causes a species of strangulation.

When it attacks the neck, it causes considerable swelling spreading over the whole chest, constricts the *œsophagus* and windpipe, rendering deglutition and respiration difficult, and

* Enaux and Chaussier and Lassus, Clinique Chirurgicale, p. 46.

threatening suffocation. Sometimes the constriction of the vessels of the head thus induced causes great swelling of the face and a species of salivation, or even nasal hemorrhage. On the chest the malignant pustule causes much inconvenience. The swelling spreads along the pectoral muscles, to the arm-pits and neck. When it appears on the back of the hand, where the adipose membrane is lax, it ascends along the arm to the arm-pit and breast.

In general a single pustule only is seen on each patient. Sometimes, however, several are observed on different parts of the body. The gangrenous eschar may not exceed in size a shilling or a half-crown piece, and may be limited to the skin and adipose tissue. But it may also be several inches in diameter, and destroy not only skin and adipose membrane, but the intermuscular cellular tissue, and even the substance of the muscles themselves.

III. ETIOLOGY.—Malignant pustule, if not endemial, prevails most in low marshy districts, during hot moist seasons, when the pasture grounds are alternately submersed by river inundations, and then rapidly dried by solar heat; when the fodder is soiled with slime, or mouldy, and loaded with putrid insects; and when the animals, especially sheep, are very subject to a very acute gangrenous fever. In the latter case, in which the disease is very speedily fatal, and the animals die without much external sign of sickness, and in which gangrenous spots and carbuncles are found in various textures after death, the contact of the cattle becomes to man a source of infection. Their blood, flesh and offal contain a poisonous principle (*virus*,) which applied to the skin may obstruct any of its pores, and induce the disease in all its malignity. It is hence believed to be always the effect of an inoculated virus.

Though malignant pustule is most frequent in those years, in which the cattle are attacked with a carbuncular epizootic, and during summer and autumn at the season of sheep-shearing, it is observed indiscriminately at all seasons; and in the coldest winters the Pustule may prevail in persons who have been handling sheep skins or cow hides long after the animals have been dead.

Malignant pustule does not, in the situations in which it prevails, attack all persons indiscriminately. It is seen chiefly, if not solely, in the persons of cow-herds, shepherds, labourers, farriers, tanners, butchers, and in general those who have occa-

sion to touch or take care of cattle, handle hides and fells, wash the wool, or work among it still recent.

The occurrence of the malignant pustule has been observed to ensue chiefly after one or other of the following circumstances.

1st, After flaying an ox, sheep, or other animal which has been killed after great fatigue or being over-driven, or in a paroxysm of fever. Thus a person has been attacked with malignant pustule in the finger after preparing a hare. A man after flaying a wolf found dead on the bank of a stream, contracted malignant pustule.

2d, A common mode is after inserting the hand and arm, in the manner of farriers, into the throat of a sickly cow or ox; and, according to Saucerotte, after introducing the bare hand and arm into the rectum of cows or oxen labouring under bloody flux (*le sang*.)

3d, Immersing the hand in the blood of animals sickly or labouring under actual gangrenous and carbuncular fever. Chabert mentions the case of a man, who, having opened an ox dead by carbuncle, applied to his face, which was covered with acnoid tubercles, his hands tinged with blood, and who was forthwith attacked with shivering, headach, faintness, and the usual phenomena of malignant pustule. An aged farrier with an unsteady hand, in treating an animal labouring under epizootic carbuncle, punctured his arm; and the disease was developed, and proved fatal in twenty-four hours. Numerous examples of this mode of communicating the disease are recorded.

It appears further from the observations of Dr Kausch of Liegnitz, that malignant pustule is very prevalent among the inhabitants of those districts in Warsaw in which the cattle are affected with the epizootic, there known under the name of Milzbrand, or gangrenous softening of the spleen; and conversely, where the Milzbrand is unknown, or little prevalent, malignant pustule, or the black blister, is unknown. *

4th, It is further stated, that eating the flesh of animals destroyed by epizootic carbuncle or fever is a frequent mode of producing the disease. It must be added, however, that Saucerotte positively asserts, that it has often happened that the poor inhabitants of Burgundy have eaten the flesh of animals destroyed by dysentery (*le sang*,) without subsequent inconvenience; † and he therefore regards the poisonous principle

* Hufeland's Journal, xxxiii. p. 70.

† Essai sur la Pustule Maligne, 1780, in Melanges de Chirurgie, Paris, 1801, p. 433.

of carbuncular pustule as in this respect quite similar to that of the viper. It must be observed, however, that the latter may be decomposed by digestion, while the former may be absorbed with little change. A singular fact on this point is recorded by Dr Müller of Winzig,—that several persons in a village in the Circle of Wohlau in Silesia, had eaten the flesh of an animal affected with Milzbrand, without any injury, yet the man who flayed the animal died with the usual symptoms of carbuncular inflammation.* From this, the narrator infers that digestion appears to divest the poison of its most malignant powers. Yet Enaux and Chaussier long ago remarked, that the flesh of such animals irritates and inflames the mucous membrane of the stomach and intestinal tube; and it is known that it produces in some persons smart diarrhœa, and in others an attack of symptoms like cholera.

5th, It is believed by several observers, that malignant pustule has often ensued after the puncture of insects. Saucerotte believed that insects, which had been preying on the carion of carbuncular animals may by puncture excite the disease in the human body. (Melanges, p. 432.) M. Maret in particular inferred, after long observation, that malignant pustule depends always on an external cause, and that it is produced by a particular insect growing in the cattle, and the puncture of which deposits the virus which produces the gangrenous inflammation. A similar idea of the origin of the disease is entertained by Mathy;† but it is opposed by Dr Kausch as inconsistent with the facts. The opinion certainly derives probability from the parts of the person on which the pustule usually appears, and from the aspect which it at first presents. But it appears at the same time, that, if the disease depends upon the inoculation of the blood or fluids of carbunculous cattle, every kind of insect which sucks the blood of an animal dead of carbuncle, and which possesses a puncturing apparatus, might communicate the disease in this manner.

Lastly, it is said that touching or incautiously handling parts in the human body affected with pustule, may be followed by the production of the disease.

In this enumeration of the etiological circumstances of ma-

* Hufeland's Journal, xxxiii. p. 74.

† Briefe uber Gegenstande der Therapie, i. Theil. Von Mathy, Berlin, 1801.

lignant pustule, which is condensed from Saucerotte, Thomasin, Chabert, Enaux and Chaussier, Mathy, Wolff, and Kausch, it is inferred, that the disease is always the effect of a peculiar animal poison ; but it is not specified as a necessary condition of the disease, that the cuticle be abraded, and that the surface of the *cutis vera* be exposed ; and indeed several of those who have studied the phenomena of this disease seem to think that the poisonous principle may be forced through the cuticle, or may be made to enter the pore of a sebaceous follicle, and may be thus absorbed. Are there any instances, I would ask, in which malignant pustule arises spontaneously, and without the contact or application of the foul secretions of sickly or over-driven animals. Dussaussoi states in his report of the diseases of the Hotel-Dieu of Lyons for 1783, that, of four cases of malignant or gangrenous pustule, two appeared spontaneously.* Saucerotte represents a drop of the blood or serum of an animal destroyed by flux, diffused on the skin, as adequate to produce malignant pustule ; and Enaux and Chaussier regard the poison as so penetrating, that its simple application to the skin without abrasion, puncture, or bite, is sufficient to give rise to the disease. (Methode, &c. p. 210.)

The appearance of this disease spontaneously or independent of Milzbrand, or some similar carbuncular disorder in the cattle, has been rendered very doubtful by the elaborate observations of Dr Kausch of Liegnitz. But these observations also show, that the disease may be induced without exposure of the *cutis vera* by abrasion of the cuticle. It appears that, though the disease is much more readily communicated by the application of the blood or recent flesh, or offal of carbuncular animals to the surface of the *cutis vera*, exposed by scratches, wounds or abrasions, or a recent cicatrix with thin and newly formed cuticle, yet it may also be induced by application of the blood or recent offal to the mucous membrane of the eyes, lips and nose, and to any part where the cuticle is thin ; that it may be communicated in a gaseous form through the cutaneous discharge from a husband to his wife ; and that a member entirely sound may, in the process of flaying an animal cut off by the Milzbrand, receive by absorption so much of the poison as to give rise to the disease, with or without pustules and black blisters. †

* Journal de Medecine, lxi. 1786, p. 12.

† Die in Konigreich Preussen und besonders im Herzogthum Warschau en-

The authentic facts known regarding the phenomena and progress of malignant pustule show, that it affords a perfect illustration of the phenomena of gangrenous inflammation in the substance, and at both surfaces of the skin, and, I may add, in the adipose tissue. That of the external surface gives rise to the formation of the vesicle or vesicles, and the dark sloughy patch. The inflammation of the internal surface affects at the same time the adipose membrane, and then causes the diffuse swelling and stiffness, and the emphysematous infiltration so often remarked in aggravated cases of the disease. In this respect, as well as in the symptomatic fever with which it is attended, malignant pustule makes a close approach to a disease not uncommon in this country,—diffuse inflammation of the adipose tissue, so frequently observed to take place in the dissecting-room, and occasionally in the persons of those who have occasion to handle recent animal matters, as butchers, &c.

Malignant pustule is endemial in Burgundy, Languedoc, Provence, the Lyonnais and other districts in the south of France, in Prussia, in the Grand Dukedom of Warsaw, and in some other places in which numerous herds of cattle are bred.

IV. DIAGNOSIS.—Malignant pustule is to be distinguished from bites of gnats, fleas, and other insects; from boil; from carbuncle; and from inflammation of the adipose membrane. Attention to the origin and course of the complaint will furnish the best means of drawing the distinction between these several forms of cutaneous lesion, and the disease now under notice.

V. TREATMENT.—The treatment of malignant pustule varies according to the stages of the disease. If it could be always known when the poison was applied or infection received, then it would be right to employ means calculated to prevent it from inducing the specific gangrenous inflammation by which it is distinguished. This may be attempted by first washing the parts to which blood or offal may have been applied with tepid water and soap, or a little soda, or a dilute solution of *aqua potassae* or *aqua ammoniae*. If it be deemed too late to attempt to remove the poison by means of detersion, the next object is to decompose it, and impede if not destroy the absorbent powers of the surface. With this view the suspected part should be freely touched with nitrate of silver or nitric acid.

When the disease has advanced to the vesicular stage, the best plan is to puncture the vesicle, discharge the fluid, and apply over the exposed corion nitrate of silver, so as to cauterize its surface, or at least change completely the action of its vessels. Other caustics have been recommended; and Enaux and Chaussier, while they properly exclude from these means the arsenical preparations, corrosive sublimate, and the mercurial agents, allow the use of butter of antimony, (chloride of antimony,) sulphuric acid, and hydrochloric acid. Sulphuric acid certainly chars the part more effectually than any other; but the nitrate of silver, which is more convenient and less painful, appears to be not less effectual. Latterly the chloride of zinc has been recommended.

When the disease has proceeded to the gangrenous stage, the proper course is to divide the skin and adipose membrane to sufficient depth, to give escape to serum, and to relieve the tension of the parts. This may be effected either by a crucial incision through the site of the pustular inflammation, or by two or more longitudinal incisions. It may be requisite even to make scarifications through the skin all round; but in general the crucial incision or two longitudinal ones will be most effectual.

Enaux and Chaussier recommend that the dead parts only should be divided, and that the practitioner should spare the living parts. The propriety of the principle of this advice is questionable; and it is further impracticable altogether to avoid the living parts. The great object is to relieve tension, to stop gangrene, and promote suppurative inflammation.

Enaux and Chaussier were desirous that, at this stage, the practitioner should apply to the bottom of the wound the nitrate of silver or the butter of antimony so freely, as to cauterize the whole surface. This, however, is rarely requisite, as at this stage it is quite impossible to expect to decompose the poison.

After these incisions, it is proper to apply the emollient poultice, with some of the gently stimulating or digestive ointments, as the resinous, or the elemi ointment, or the turpentine liniment, until separation of the dead slough is effected, and suppuration and granulation are established.

The general treatment must be conducted on the same principles as that directed for carbuncle and boil; and in more ex-

quisite and intense cases, where there is much delirium or typhomania, the treatment should be similar to that observed in continued malignant fever (*Typhus*.) The head should be shaved; cold applications should be used, or blisters should be applied; and the patient should be freely purged by means of calomel and jalap, or calomel and colocynth. As sweating seems often to produce a natural crisis, it may be proper to administer acetate of ammonia or tartrate of antimony in divided doses, with a little solution of muriate of morphia.

In the suppurative stage, it may be proper to allow the use of wine, or good, but not strong, malt liquor.

§. IV. Whelk or Bubucle, (*Acne*; *Ionthos*; *Varus*, *Vari*. Celsus.)

Distinct, hard, red eminences of the skin, on the face, especially the brow, cheeks, and chin, sometimes the nose, more rarely the neck, shoulders, and upper part of the trunk, appearing simultaneously or successively, stationary for weeks, or undergoing slow and imperfect suppuration. These bodies are termed *tubercles* by Willan; but as this name has been long applied to a particular kind of morbid growth, and as they do not particularly resemble tubercles of the other membranes, or of the parenchymatous organs, either in structure or in pathological properties, the term is not appropriate. Their red colour, elevation, circumscribed swelling, occasional pain, and their termination in blood-coloured, serous suppuration, show them to be examples of inflammation of the corion; their slow progress and deep seat show this to be chronic; and it is perhaps more consistent with sound pathology to consider these bodies as chronic pustules of the substance of the corion. They are the *vari* of Celsus and the Roman physicians, and the whelk or bubucle of the old English authors. They are said to occur almost exclusively in persons of the sanguine temperament. I have seen them, not only in those of fair complexion, which is regarded as one of the principle marks of this temperament, but in those of swarthy colour. They almost never appear before puberty; but may occur at any period after it, to thirty or thirty-five years. They may occur in either sex, but are most common in young men. The forms which the eruption assumes have been referred to four heads; the simple whelk (*Acne simplex*), the black whelk (*Acne punctata*), the inveterate whelk (*Acne indurata*), and the crimson whelk (*A. rosacea*.) Their characters are as follow.

Simple whelk; (*Acne simplex*.) Small, distinct *vari* or whelks, not numerous, or accompanied with much redness, or intermediate affection of the skin. They rise gradually with redness, and some slight pain; and after eight or ten days may either subside, throwing off the cuticle in cracked peelings, or form at their summit a bloody matter, which in two or three days more is discharged by a spontaneous opening, with diminution of redness, hardness, and pain of each. In the first case, the place of the whelk is marked by a purple stain or blain, which gradually disappears; in the second, a scab is generally formed, which drops off at the end of the third week, leaving in some instances a permanent depressed scar.

Black Whelk; (*Acne punctata*.) Combined with the eruption now described, it is not uncommon to see the skin of the countenance, especially on the brow or near the nose, set with small black points, with slight surrounding elevation. These black points, which are vulgarly considered as the extremities of so many worms, are in fact the blackened ends of mucous or sebaceous matter, moulded in the ducts of the sebaceous glands into a cylindrical shape. As foreign bodies they cause slight inflammation of the neighbouring skin, and sometimes partial suppuration. This form of the disease constitutes the black or punctuate whelk.

Inveterate Whelk; (*Acne indurata*.) Large, hard, conical or oblong conoidal whelks, of a red, or crimson-red, or livid colour, with some lustre, permanent and stationary, or undergoing slow and partial suppuration. Some are pointed, and seem as if about to suppurate, yet may, after throwing off the cuticle, or a crust consisting of cuticle and hardened bloody matter, become round and smooth again. Others terminate in a pustular suppuration at top, but without diminishing the hard, firm stool on which they are set. Others, again, undergo a more complete solution, are slowly converted into curdy matter mixed with blood, which is discharged at intervals in small portions, with abatement of redness and heat, until, after many weeks, the swelling disappears, leaving behind it a permanent depressed or level scar, which is often smooth, and never after covered with hair. This is a satisfactory proof, if others were wanting, of the corion being affected in this disease, and of the consequent ulceration. In other instances this species of whelk

leaves a discoloured spot or blain, which remains long permanent.

These bodies are the seat of a painful sense of heat, not very acute, but sufficiently disagreeable; and the whole face is generally more or less affected with a similar sensation. The adjoining skin is generally slightly red, or rather livid, and the whole countenance is in general dingy, or of a dirty sallow colour, unlike the clear fresh complexion of sound health. Yet the general health does not appear to be affected; and in many instances the eruption disappears during temporary disease, but returns as the individual is restored to health and strength.

Crimson wheik; *Dartre pustuleuse couperose* (*Bacchia*, *Acnerosacea*, *Gutta rosea*.) In this form of the disease, besides an eruption of small suppurating wheiks on the cheeks and nose, the adjoining skin of the face is red, shining, and irregularly marked with rough granulations, so as to render the whole countenance fiery-red. The disease, indeed, generally commences with mere redness, and slight diffuse swelling of the skin of the nose or cheeks. This is followed by the appearance of two or three small seedy pustules, very hard, but red and tending to suppurate, which at length takes place at their summits partially, while the base remains hard, red, and firm. As the red appearance of the skin spreads, the roughness increases, fresh pustules of the same seedy consistence arise, and undergo the same course, and some of them coalescing, form broad tubercular blotches of a crimson or livid colour, and irregular notched surface. These form the bubucles, wheiks, knobs, and flames of fire so emphatically described by Fluellen in the face of Bardolph; (Henry V. Act 3d.) The skin is not, however, in this state permanently red at all times. I have seen this affection in patches on the cheeks and nose, so light-coloured, that in the morning it could not be suspected; but in the latter part of the day, after taking wine and becoming warm, these patches became intensely red, inclining to crimson. In the more advanced stage, when numerous tubercles appear, and the surface is generally rough and red, the skin swells diffusely, and is seamed with tortuous purple veins; the nose is enlarged; the nostrils become distended, their surface is notched or fissured into lobes; the wheiks on the cheek become large and coherent, and the whole countenance is converted into a red or crimson tumid mass, in which the original features are prodigiously de-

formed. As the disease continues, and the patient advances in life, the face becomes purple or livid, and retains this colour during life, which is usually cut short by disease of the brain or heart. These welks do not often undergo suppuration, but are constantly throwing off the cuticle in the form of peelings, or scales, or crusts. When suppuration does occur, it is liable to terminate in bad and intractable sores.

The causes of the welk eruption are not always very obvious. The first, second, and third species occur chiefly in young persons of both sexes after puberty, especially if the complexion be either fair, or partly fair partly dark, with a waxy leaden colour of the skin. The individual appears to enjoy good health; but if particular inquiry be made, it will be found that the functions of the stomach and bowels are liable to derangement, in the symptoms of bad taste in the mouth, occasional heartburn, heat of face and hands, furred tongue and lips in the morning, costiveness, and, above all, in the skin being dry, waxy, or imperspirable, and the secretions liable to interruption or disorder. In some instances, it has been observed that these complaints are less violent when the eruption is most red and numerous, but more distressing if it seems to abate. This does not show, as was imagined by the humoral pathologists, that it is either critical or symptomatic of the symptoms of disordered stomach; but that the same general cause which occasions the derangement of digestion and secretion also produces the eruption on the skin of the face. This eruption, indeed, is the result of an aberration of the vital force, as it were, of the cutaneous circulation, and is part of the intimate connection which subsists between that circulation and the conditions and functions of the gastro-enteric mucous membrane. I do not here pretend to specify the precise cause of this morbid action; but I think it certain, that the same which causes the derangement of the alimentary function, produces in proper subjects the cutaneous eruption.

The influence and existence of this cause is more distinctly seen in the last species of the disease, the crimson welk or Fire-Face. It is perhaps a well established fact, that this never occurs unless in consequence of the habitual use of wine and spirituous liquors; and as it is also known that the constant use of such substances first over-excites and irritates the gastric and gastro-enteric mucous membrane, and impairs the powers of the stomach, and then deranges the whole capillary circulation of the stomach

and intestines, and of the abdominal viscera in general, it is not difficult to see the manner in which the eruption of the face is connected with the derangement of the internal circulation.

Little doubt can be entertained that the eruption of *Acne* is seated chiefly in the sebaceous follicles. In one variety of the disease, the *Acne punctata*, this is placed beyond doubt by the fact, that the small black *vari* are enlarged follicles, with obstructed apertures, and the black points their sebaceous excretion darkened by dust, smoke, and other colouring matters. In the *Acne simplex* also, with which the *vari* of *Acne punctata* are always intermingled, the follicular character of the disease is indicated by the site of the individual *vari*, by their size and figure, which is generally oval, or hemispheroidal, by the tardiness and incompleteness of the suppurative solution, and by the depressed smooth marks which they often leave behind them.

I have witnessed an example of this disease in which distinct large *vari* appeared all over the dorsal surface of the trunk, and in which the *vari* were oval, with the long diameter corresponding to the longitudinal plane of the body.

In the case of *Acne rosacea*, the affection of the follicles is subsequent to an affection of the skin generally. But when the disease is established, the enlargement of the sebaceous follicles of the nose is manifest.

Though Bateman has represented the acnoid eruption to be little dependent on constitutional disorder, yet the marks of its connection are obvious to the careful observer. In subjects, in whom *acne* appears, the skin is dry and cold, and does not easily perspire, or when it does, is bedewed with a cold, unctuous sweat. The circulation of the skin is in short languid, inert, and torpid. This state of the cutaneous circulation and secretion is, however, connected with an imperfect and languid circulation of the gastro-enteric mucous membrane, and sometimes of the bronchial membrane, or the uterine membrane in females, the first indicated by foul tongue, bad breath, or bad taste in the mouth, slow and torpid state of the bowels, yet often voracious appetite; the second by chronic cough and *dyspnœa*; and the third by leucorrhœa and painful menstruation. This state is not easily removed by medicine; but it may undergo a spontaneous change in the progress of life; and it is much facilitated and promoted by those agents which improve the circulation of the skin, for instance, frictions, dry or moist, the tepid and cold bath, exercise, but, above all, gymnastics, and

a steady course of training. Under the use of this agent the circulation of the skin becomes more active, and the tendency to *acne* gradually diminishes, and at length disappears.

The treatment of this disease cannot be said to be well understood. There is little doubt that judicious management of the functions of the stomach and bowels is of the utmost consequence. But it is a gross mistake to suppose that the frequent use of purgatives, so much practised both among professional and unprofessional persons, is of any benefit. These medicines act only on a symptom of the constitutional disorder, but have no effect whatever in removing the disorder. The most rational, and, according to my experience, the most successful mode of managing the constitutional complaints, is to arrange the food, and exercise in such a manner, that it may be digested without causing headach, burning of the cheeks and palms, dryness of the mouth and furring of the lips; and that the bowels may be emptied regularly and periodically once a day at least. The particular means, by which these purposes may be effected, will be found under the head of Stomach Complaints and Indigestion; (*Dyspepsia.*)

The local management has been supposed to be of much consequence, and it is undoubtedly very desirable to remove objects which cause so much personal blemish. It is unfortunate, however, that our applications, which sometimes are useful in the slighter forms of the complaint, are too often completely inert or unsafe in the more severe forms. The safest are lotions containing spirit of wine in various proportions in the spirituous solutions of any of the essential oils, as rose-water, lavender-water, or elder-flower water, which may be used in the most irritable state of the welks with benefit and alleviation. Next to these, potass in the proportion of one drachm of its water in six ounces of common water, or hydrochloric acid (muriatic,) in the same proportion, or water impregnated with chlorine, form useful applications. The sulphurous waters have acquired some repute in the treatment of these affections; they may be imitated by infusing boiling water on sulphur, in the proportion of one quart to one ounce for twelve or fourteen hours. Perhaps the sulphur vapour bath would be a more powerful mode of applying the remedy, which may be aided in either case by its internal use. The spirit of Mindererus (*liquor ammoniae acetatis*), and even acetic acid, have also been used as local applica-

tions. But the most powerful, and certainly in some instances successful remedy, is a spirituous solution of corrosive sublimate (bichloride of mercury,) in the proportion of half a grain or one grain to one ounce of spirit. Gowland's lotion, an empirical preparation, well known as in general use, is said to consist of corrosive sublimate in an emulsion of bitter almonds. This I have imitated in practice, and have found it under proper management, a good application, not only for the face-whelk, but many other eruptions incident to this part of the skin. On the same principle I tried the hydrocyanic acid, properly diluted, and found that it was likewise possessed of resolvent or discutient powers. It must not be forgotten, however, that in some instances the eruption disappears spontaneously, as the alimentary function and general secreting circulation get into better order. Judging from considerable observation and experience, I would say that whatever has a tendency to correct these important functions, and retain them in the best possible condition, will remove this chronic eruption; and that its most certain remedy will be found in a system of regular corporeal training, in the exercises of fencing, boxing, running, walking, or even dancing, with due attention to the kind and quantity of nutritious food, and to the state of the excrementitious discharges.

Nothing will alleviate or remove the crimson whelk, short of rigid abstinence from vinous and spirituous liquors of every description. When this is done, there may be room for the remedies enumerated above; but before this they are useless and unseasonable.

§ V. Chin and Scalp Whelk (*Sycosis*.) Dartre pustuleuse mentagre, (*Mentagra*.)

Red doughy pustules or tubercles in clusters or irregular patches on the bearded portion of the face and on the scalp, in adults. In the first case, soft whelks red and smooth, about the size of a small pea but conoidal, appear below the under lip, or in the prominent part of the chin, afterwards along the under jaw up to the ears, and down on the neck as far as the beard extends. These whelks attain their full size, which is that of a pea in seven or eight days; and many continue in this condition for three, four, or six weeks; others suppurate slowly, and partially discharging a small quantity of thick matter like honey, but mixed with points of blood, which mats the hair

of the skin together, and prevents complete shaving. It is accompanied with considerable itching. The duration of this eruption is uncertain. In some acute cases it may be over in the course of four or five weeks; but there are chronic cases, in which, after the acute form of the disease has disappeared, successive wheelks continue to arise on the chin for months. It may disappear for a season and break out again. Though it occurs chiefly in men, women are not exempt from a slight form of the eruption. This must not be confounded with the face-wheelk; (*Acne indurata.*)

In the second case, clusters of wheelks, softer and more pointed than in the former, affecting the circular form, appear about the margin of the scalp, or the hind head, or round the brow, and temples and external ear, which may be included in the eruption. In eight or ten days they suppurate, coalescing, and forming an elevated, unequal, and ulcerated surface, somewhat granulated, so as to resemble the pulp of a fig, and discharging a thin watery fluid, which emits an unpleasant rancid odour. This disease will be easily distinguished from the pustular scall.

In both cases the disease consists in a chronic pustular inflammation of the substance of the corion; perhaps connected with the bulbs of the hair.

When the wheelks are red, sore and raw, a poultice of linseed or bread-crumbs and milk, is the best and most lenient application. When the eruption is less tender, it may be washed with tepid water, either alone or containing any of the mild vegetable astringents. The healing process will be promoted by the application of the zinc ointment, the saturnine ointment, or the citron ointment, diluted with four times its weight of simple cerate or lard, or the white precipitate ointment, either alone or with an equal portion of the zinc or saturnine ointment.

Alterative doses of calomel or the blue pill, with decoction of bark, or snake-root with or without the fixed alkalies may be likewise administered.

§. VI. Canker, Dartre Rongeante, Pinel and Alibert. *Noli me Tangere*, and Wolf of Wiseman and others. (*Lupus.*)

“ I appropriate this word *Noli me Tangere*,” says Wiseman, “ to a small round acuminate tubercle which hath not much pain, unless it be touched or rubbed, or otherwise exasperated by topics. Concerning which, *Rogerus* saith that *Cancer plus*

corrodit uno die quam Noli me tangere in uno mense. But if so exasperated, it is immediately enraged, and becomes a true cancer. Such as these are sometimes found in the face and lips; but do likewise happen in all other parts of the body. I have seen them in the arm. Particularly a person of about sixty years of age, of a healthy constitution, hath one in the outside of his right arm, a little above the elbow. He weareth a cup upon it of light wood, with straps fastened to it which brace it on, and defend the part from the pressure of his sleeve. He sent for me one morning to see it when he was in bed, his arm lying out covered with a light mantle. He turned up his sleeve, took off the cup and showed it me. The tubercle was small, of a bluish colour, and looked as if it had been a *varix*; it was without inflammation, hardness or change of colour in the parts about it. He did not permit me to look long upon it; the while I did, I saw it rise into a tumour as big as a kernel of a hazelnut. Such another I saw in the arm of a woman of about forty years of age, of a blue colour, in the outside of her arm."

It is not quite evident whether the disease here described by Wiseman is the same as that which appears on the face in the form of small hard eminences, which terminate in suppuration with much destruction of skin, and cellular membrane. I have seen only one example of his bluish tubercle in the person of a woman of about sixty-five years of age, otherwise healthy. It was situate on the side of the nose, near the middle of the right nasal bone. It appeared at first in the form of a small red prominence less than a pea, but gradually shot up from the skin, so as in the course of twenty months or two years from its commencement, to project at least one-third of an inch from the surrounding skin. When I saw it, it was round or globular, smooth and even shining, and of a blue or purple colour, which on close examination was derived from numerous small vessels. It was connected to the skin by a neck, the base being narrower than its summit, but did not adhere to the bone. I did not learn what was the ultimate fate of this person; but there can be no doubt that, if life were continued a sufficient time, it would terminate in bad fungating ulceration.

I have, on the contrary, seen many cases of ragged ulceration of the countenance, and one or two in the incipient state, before it had spread to any extent. One mode in which this disease appears to commence, is by the formation of a patch of red hard skin, which is slightly but diffusely swelled, and is

the seat of a hot, gnawing, smarting sensation. Though smooth on the surface, it is found, by examination, to be irregular, or very soon becomes so by the formation of small, hard, round pustules, which after some time begin to be acuminate, and throw off the cuticle in peelings. Thin watery vesicles not unfrequently appear of no determinate shape or figure, which either burst the cuticle and discharge their fluid, or appear to cause an insensible dewy oozing all over the surface. The most usual seat of this form of cutaneous inflammation is the side of the nose, one of the alæ, or a small part of the cheek. After the disease has subsisted in this form for some time, it may disappear spontaneously, the skin becoming of its natural colour, soft, and without pain. More frequently, however, the cuticle continues to be thrown off in peelings; vesicles, and pustules continue to be formed; and one or other more red and painful than the rest, at length is covered with a small scab, which dropping discloses a hollow sore, with a smooth ungranulating surface, and a scanty thin blood-coloured purulent discharge, which generally forms a fresh crust or scab. This either spreads without showing any disposition to heal, or coalesces more or less completely with other sores which are generated in the same mode, and undergo the same process. After going on in this manner for weeks or months, a tendency to healing is manifested in some parts, while others continue to spread. The parts which heal are irregularly seamed and scarred.

This form of the disease appears to be what Wiseman terms the eating herpes, and describes in the following terms,—“*Herpes Exedens* is said to be rather an ulcer than a tumour, but is indeed, an ulcer with a tumour, it rising in the skin in a small tubercle, on the top whereof there appeareth an ulcer like a pin-hole. It is for the most part without inflammation or pain. When it ariseth alone, it is scarce taken notice of, it mattering but little unless it be picked, and then it scabs soon after with a thin scurf. But in progress of time it sheweth its ill condition, by eating away the skin, and indurates the flesh underneath and parts about. Sometimes I have seen these ulcers arise in the skin, somewhat distant one from another, making an unequal furrow; as from the upper lip by the nostril creeping to that side of the nose, so to the ridge of it, and down again to that corner of the eye, healing in some places, while it eats deep into the flesh in others.” (Chap. xvii. Book i.)

§. VII. White scall (*Vitiligo*.)

This disease, which is rare, and not accurately known, has not come under my own observation. It is described as characterized by smooth, white, shining tubercles, which rise on the skin of the ears, neck, and face, sometimes over the whole body, intermixed with shining pimples. They vary in course and progress; some are said to reach their full size in a week; and afterwards subside to the level of the skin in about ten days; or they may advance less rapidly, be more permanent, and spread along the surface, shedding the hairs as they proceed, and marking the skin with a veal-skin aspect,—smooth, white, shining, and hairless. They never terminate in ulceration. There is reason to believe that the changes here mentioned are the effects of diseases which have been already considered, or which are yet to be examined.

Medicines, either external or internal, are said to have no effect on this state of the skin.

§. VIII. Yaws. *Frambœsia*. Sa-fath. Ebn-Tsina; Safatha of the Arabs. Pian, Epian, Pian-Pian, Boba, Portuguese. *Bihl*; Bulloms. *Tirree*, or *Catirree* Timmanees. *Mansera* Mandingoes. *Dokkettee* or *Kota* Soosoos. *Thymiosis*, Swediaur.

Edinburgh Medical Essays, Vol. v. p. 2, Art. 768. [This paper, though anonymous when published, was afterwards known to be by Dr John Hume.]—On the Air and Diseases of Barbadoes, by William Hillary, M. D. London, 1766.—Godfried Wilhelm Schilling *Diatribe de Morbo in Europa pene ignoto quem Americani vocant Yaws. Ultrajecti*, 1769.—Apud Schlegel *Thesaurum Pathologico Therapeuticum*, Vol. ii.—Macpherson, *Dissertatio de Frambœsia*. Glasguæ, 1785.—Observations on the Diseases of the Army in Jamaica, by John Hunter, M. D. &c. Lond. 1788. Chap. viii. p. 306.—Tode, *Dissertatio de Frambœsia*. Hafniæ, 1789.—*Tentamen Medicum Inaugurale de Frambœsia, &c. quod Eruditorum examini subicit Jonathan Anderson Ludford, Jamaicensis*. Edinburgi, 1791.*—*De Morbo Yaws dicto et de Vena Medinensi Specimen*, Anno 1797. Halæ editum a Frid. Guil. Kunsemuller, M. D. *Detmoldia-Guestphalo et Practico Surinamensi*. Apud Brera *Sylloge*, Vol. iii.—The Medical Assistant, or Jamaica Practice of Physic, &c. by Thomas Dancer, M. D. Kingston, Chapt. ix. p. 201. 1801. 2d Edition, 1809.—Medical Tracts, by Benjamin Mosely, M. D. London, 1800. P. 184.—Account of the Native Africans in the neighbourhood of Sierra Leone, by Thomas Winterbottom, M. D. 1803, Vol. ii. Chap. viii.—Observations on Morbid Poisons, Chronic and Acute, &c. 2d edit. by Joseph Adams, M. D., F. L. S., &c. London, 1807, 4to, Chap. xvi. p. 196.—Medical and Miscellaneous Observations relative to the West India Islands by John Williamson, M. D. Fellow of the Royal College of Physicians, Edinburgh, &c. 2 vols. 8vo. Edin. 1817. *Passim*, and Essay on the Yaws in Vol. ii. p. 142.—Observations and Experiments on the Nature of the Morbid Poison called Yaws, by James Thomson, M. D. Med. and Surg. Journ. Vol. x.

* This Dissertation was originally written in English by Dr Wright.

321, 1819; and Vol. xviii. p. 31, 1822.—Practical Observations upon the Yaws, by James Rankine, M. D., and Ed. Med. and Surg. Journal, Vol. xxvii. Edin. 1829.—A Descriptive Account of Frambæsia or Yaws, by David Mason, M. R. C. S., &c. Edin. Med. and Surg. Journal, Vol. xxxv. p. 52. Edin. 1831.

I. This disease Sauvages was led, it is not easy to understand for what reason, to place among the order of Cachectic maladies, and to distinguish into two species according as it occurs in Africa or the coast of Guinea (Yaws; *Frambæsia Guineensis*,) or in the West India Islands and America (Pian or Epian; *Frambæsia Americana*.) The latter distinction, which was made principally on the authority of M. Virgile, a surgeon at Montpellier, who, during a practice of twelve years in the island of St Domingo, had treated several thousand cases, was manifestly completely unfounded, and was accordingly abolished by Cullen, who regarded them as mere varieties of the same disorder.

The true nosological nature of the disease was, however, imperfectly understood by European physicians; for Sagar placed it among the TUBERA, or cachectic diseases with external swelling; and Cullen followed the example set by Sauvages in placing it among the cachectic maladies with syphilis, scurvy, *elephantiasis*, and leprosy. Sprengel and Kunsemuller afterwards attempted to distinguish between the yaws and the disease named Pians; and this distinction Joseph Frank adopts.

Dr Jonathan Anderson Ludford, a native of Jamaica, in his Inaugural Dissertation, or rather Dr William Wright, the original author of that dissertation, had the merit of first rectifying the erroneous notions to which the arrangement of the disease by Sauvages and Cullen had given birth. They showed that yaws was a true cutaneous eruption or inflammation; and, though more chronic, yet, like small-pox and other acute eruptions, it is preceded by febrile motions, and observes a regular period of accession, growth, maturity, and decline. A few years after, Frederic William Künsemuller, a Westphalian, who had practised at Surinam, gave a short but learned and accurate history of the disease, which he regards as a cutaneous eruption, though allied to syphilis, and described well its preliminary symptoms. The general accuracy of these facts was confirmed by Dr Winterbottom, who saw it often among the Negroes of the Sierra Leone coast. Dr Dancer, who observed it in the West Indies, admits that the eruption seldom makes its appearance without pre-

vious indisposition,—languor and listlessness, pains in the bones, and dry skin, with change of its colour; but doubts the propriety of comparing it with small-pox and other eruptions. Dr Joseph Adams has detailed in his work on morbid poisons, a case of yaws which occurred in the person of a European, ten months after he left the West Indies, and added some important facts to the history and pathology of the disease. Dr Williamson published in 1819, in his work on the West Indies, an instructive practical account of the phenomena and progress of the disease, illustrated by some valuable remarks on the best mode of treatment. This essay, I fear, is less known than it deserves to be; as it is never referred to by any of the subsequent authors who have treated of this disease. Lastly, a minute, and, on the whole, a pretty accurate account of its phenomena, and of the laws to which its communication and formation are subject, is given by Dr James Thomson of St Thomas in the Vale, Jamaica, in two papers in the fifteenth and eighteenth volumes of the Edinburgh Medical and Surgical Journal; and two papers have since appeared in the same work by Dr Rankine and Mr Mason. As the observations of Dr Thomson were made with a knowledge of the descriptions of previous authors, and especially of the researches of Adams and Winterbottom, I shall follow him chiefly in the account which I now submit of this eruption.

II. There is no doubt, from the united testimony of Ludford, Wright, Kunsemuller, Williamson, Thomson, Rankine, and Mason, that the appearance of Yaws is constantly preceded by more or less indisposition,—as languor, pains of the limbs like those of rheumatism, and chillness or shivering, succeeded by general heat and uneasiness, amounting in most cases to fever, and always more severe and distinct in children than in adults.

These symptoms may last for weeks, with great lassitude and oppression; while the pure glossy-black colour, the index of health in negroes, gives place to a dirty dull appearance of the surface. According to Kunsemuller, also, it appears that symptoms of gastric disorder, often amounting to *pica*, ensue at this stage; and the patients not only loathe food, but take to eating chalk, coals, earth, and similar indigestible articles. This, however, may be a complication of dirt-eating with the fever of yaws.

Before the eruption appears, the whole cutaneous surface may be covered with a white mealy scurf, as if the person had

been dusted with flour. After this has remained for a few days, small firm pimples like pin-heads may be seen on the forehead, face, neck, groins, and round the anus. These continue to increase for six or ten days, when their tops are covered with a crust, and an opaque whitish fluid, which is an ill-formed matter, may be recognized. Thus converted into pustules, they gradually enlarge, still covered with crusts, which are loose and irregular, until they attain the size of a sixpence, or even of a shilling. In general they are largest on those parts on which they have appeared first;—as the face, the arm-pits, groins, *perinæum*, and round the anus. If in this state the crust be removed, a foul sloughy sore is exposed, which Adams calls a rough whitish surface, consisting partly of slough, partly of living animal matter. The pustules, however, may burst spontaneously, and discharge a thick viscid matter, which hardens into a foul crust or scab on the surface. In the larger pustules, this surface at length shoots up a red granulated excrescence, not unlike a wild-rasp or mulberry. This substance is the proper yaw which gives the disease its peculiar appearance and character. Its size varies according to that of the pustule from which it rises, from a pea to that of a mulberry, sometimes of considerable bulk. Its colour also varies according to the general health of the subject. In healthy patients it is red like a piece of flesh, and prominent; but in weakly or puny subjects it is pale and white, like a piece of cauliflower, elevated, and bleeds on the slightest touch. The yaw-fungus has but a small degree of sensibility, and does not smart when the juice of the capsicum is poured on it, never suppurates perfectly, but gradually discharges a sordid glutinous fluid, which dries into an ugly scab round the edges of the excrescence, and covers its upper part, if much elevated, with white sloughs. This glutinous fluid is the proper yawey matter, and will communicate the disease by inoculation.

Thomson endeavoured to ascertain the exact period at which the fungous granulation rises; but found it to be irregular. He met with it so early as one month after the first appearance of the eruption, and so late as three; and he concludes that its formation cannot therefore be taken as a mark of the second stage of the disease as was thought by Adams. (*Morbid Poisons*, p. 201.) It seemed to depend much on the constitution of the patient, and appeared soonest in the robust, and those who were

well fed. Each pustule, as it attains a certain size, undergoes the same process in those whose general health is good, and their circulation energetic; so that in robust subjects there are pustules and yaws of every size. When the yaw has remained for some time, it gradually contracts, diminishes in height, and as the pustule heals, is finally covered with skin. It leaves in general no mark except in those places in which the inflammation has been considerable, when a scar similar to that of the cow-pock, but broader and more superficial, is left.

When no more pustules are thrown out, and when those already on the skin no longer increase in size, the disease is supposed to have reached its *acme*. About this time it happens on some part of the body or other, that one of the pustules becomes much larger than the rest, equalling or surpassing the size of a half-crown piece; it assumes the appearance of an ulcer, and, instead of being elevated above the skin like others, it is considerably depressed; the surface is foul and sloughy, and pours out an ill-conditioned ichor, which spreads very much by corroding the surrounding sound skin. This is what is called the master or mother yaw. If proper attention be not paid to keep the surface of the ulcer clean by daily washing, the matter becomes very acrid, and when near a bone sometimes affects it with caries. (Winterbottom, Vol. ii. p. 144.)

When the fungous or mulberry-like excrescences appear on the soles of the feet, they are prevented from rising by the resistance of the thick hard epidermis, and are so painful that the individual is unable to walk. The granulations (*fungi*) thus situate are called by the negroes in the West Indies *Tubbæ* or crab yaws. They may be so large as to cover a great part of the foot; in other instances they are not larger than a shilling. They are affected, like corns, by different states of the atmosphere, especially by rainy weather.

This account will communicate an idea of the progress of an individual pustule and sore. But it must be remembered that many sores are undergoing at the same time or in succession the same changes. The duration of the disease will depend not only on the time which is spent in these changes, but also on the number of crops or eruptions, which may be one, two, or three. Where there is only one copious eruption, and where the pustules and their yawey granulations are large, florid, and marked with well defined edges, they continue on the skin for a

considerable time, (from seven to twelve months,) the individual enjoys his usual health, and when they contract, no scar remains. In this form, which is the most favourable, when the individual is robust and well fed, the disease terminates in about seven or eight months. In other instances, when the patient is puny, and appears to loose flesh, a few small watery yaw pustules (*Guinea corn yaw* of the negroes) appear, and after continuing a month or two without producing the usual fungous excrescence, recede entirely to the imminent danger of the general health. Under the use of nourishing diet and warm clothing, in a month or two the eruption returns more copiously, with a broader base, and more elevated surface ; and if the powers of the patient are adequate, the disease continues out without again receding, until it disappears in regular course. If it again recede, however, or be otherwise incomplete, the eruption or crop may be repeated the third or fourth time, always with febrile symptoms, and with much injury to the general strength of the individual. It is believed by the old nurses who have much personal experience of this disorder, that the yaw is broader, and the number fewer as the disease is of longer continuance. But this is not universal according to Thomson, who has often seen a copious eruption dry up and be succeeded by the small watery yaw (*Guinea corn yaw*), which discharged nothing but thin acrid fluid, and required the utmost care to prevent the sore from getting into the state of an irritable ulcer. These phenomena are most common in weakly ill fed children, or in delicate female negroes ; but in some instances in which the greatest care is taken, and the most liberal allowance of food regularly given, children may remain free of the disease for twelve months, or have only a small incurable sore on the foot, and some months after return with all their former symptoms.

When the disease attacks the throat it causes much distress ; the sores, which never throw out fungus, resemble a piece of toasted cheese ; and before the susceptibility is destroyed, the patient is deprived of the greater part of the palate by repeated inflammation and ulceration.

Some of these statements are at variance with what has been said by Winterbottom, according to whom adults are more severely affected than children. This must be understood as a general conclusion, applicable to the natives of Africa in early life, most of whom pass through the disease at that period, as European children used to pass through small-pox.

III. The imperfect knowledge of this disease possessed by European physicians, readily accounts for the mistaken views which were entertained of its nature and character. The above description shows not only that it is an inflammatory disease of the skin, but that it is not, strictly speaking, an example of a tubercular disease of that membrane, as in the arrangement of Willan is erroneously represented. Its phenomena and the process of the individual points of inflammation show, that it is an inflammatory action of the corion commencing in minute points, and gradually spreading in extent, and penetrating in depth, till it generates a peculiar product, which, after undergoing certain changes, at length spontaneously is removed, and allows the sore to heal. Thomson has justly remarked, that the disease is first papular, afterwards pustular, and afterwards consists of yaw; though this is not constant, as the ulcer may heal without the formation of this substance; when it must be termed pustular. It appears at no period to be truly tubercular; for the yawey growth, to which alone this name can be applied, is rather an effect of the pustular or chronic corial inflammation modified by a particular cause, the proper yawey matter and action. "If in the early stage," says Adams, "of the pustule you remove the cuticle, you are to expect a ragged but moist slough. In a later stage, if you remove the scab you will find a red *fungus*, varying in shape, size, and colour, according to the period of the yaw. Where the inflammation is very high, you will neither have scab nor *fungus*; but when suppuration ceases, the part will skin over and leave a pit." From this it may be inferred, that when the yawey action is sufficient and not excessive, it generates the proper fungous growth, under which the corion is either not materially injured or is regenerated; if the action be too violent, this growth is either destroyed or prevented from appearing; and in either case the corion is irreparably injured.

IV. Yaws are endemial in certain parts of Africa, and among certain tribes of native Africans. It is remarkable, however, that, in various parts of this country, it is unknown. There is no proof that it was ever known in Tunis, Egypt, or any of the northern districts of the African continent, excepting Morocco, where Lempriere states it prevails. According to Bruce it is found in Abyssinia. It is common among the negroes of the West Indies, and of North and South America, among whom it has been introduced in the persons of African natives

imported as slaves. It is said to have been imported into Europe; but it has never been known to spread.

It is contagious, and it cannot be communicated in any other mode than by actual contact of yawey matter to the exposed surface of the corion. If applied to the unbroken cuticle, no effect follows; but if it be either forced through that membrane, or touch the slightest abraded point, the eruption is sure to follow. This explains its greater frequency among negroes who, in the West Indies, are rarely without it, than among the white population, who very rarely suffer the disease. The complaint is sometimes inoculated by means of a large fly, called in the West Indies the yaw-fly. When this insect alights on a running yaw, which the Africans never keep covered, and afterwards settles on the body of an uninfected person, it introduces the poison if there happen to be a wound or scratch there, with certainty and effect. In like manner, according to Bancroft, none ever receive this disorder whose skins are whole; for which reason the whites are rarely infected; but the backs of the negroes, being often raw by whipping, scarce ever escape. There is no doubt, however, that Europeans may have the disease, as Home shows with regard to an English female who received it from her husband; himself appearing European; Winterbottom, in the case of a slave-trader in the Rio Nunez; and Adams, in the case of the Danish nobleman, mentioned in his work on Morbid Poisons.

In the observations of Thomson, the disease was communicated in one instance by the matter of small-pox, taken from a negro girl apparently healthy; but who had three yawey sores in the arm-pit. This accident led to the inference, that the disease might be transmitted in the fluids, healthy or morbid, of an infected person. But in a subsequent experiment, in which he ordered four children to be inoculated, each in five places, with blood taken from a subject covered with yaws, the punctures healed immediately, and no effect followed. The period at which the yawey matter is matured or capable of communicating the disease is not known.

It has been asserted by Mosely, who has uttered about this disease several unfounded statements, that yaws break out in negroes without communication, society, or contact; and that the seeds of the disease descend from those who have had it to their latest posterity. The accuracy of the latter statement is questioned by all.

It is generally believed among the negroes, and admitted by European physicians, that this disease can be communicated once only to the same individual; and that those who have passed through yaws are not again susceptible of its infection. Thomson, however, admits, that Dr Owen, an old practitioner of Jamaica, met with two instances of the disease appearing twice in the same individual. Twenty years elapsed between the first and second eruption. In other instances it has been observed, that the yaw poison applied to a person who has already passed through the eruption, gives rise to very unpleasant local effects. A mother, for example, who suckles a child labouring under yaws, has the nipple excoriated from the acrid matter round the mouth. The irritation spreads, and a foul phagedenic sore consumes the breast, and produces death by spreading to the arm-pit, and causing destruction of the blood-vessels.

A person labouring under yaws may be affected with other cutaneous inflammations, arising from a contagious poison, at the same time. This was affirmed on experience by Dr Ludford, and has been confirmed by subsequent observation. Dr Dancer states, on the authority of Dr Nembhard, that in 1784 several negroes in Jamaica, when labouring under yaws, were inoculated with variolous matter, had the small-pox eruption at the same time with the yaws, and that, upon the decline of the small-pox, the yaws also gradually disappeared, (p. 230.) Thomson states, that he knew yaw patients have small-pox and chicken-pox; and in several yaw-children whom he ordered to be vaccinated, the cow-pock went through its different stages with regularity, and without difference in the time of healing of the sores.

The interval which elapses between the reception of the poison and the formation of the eruption, termed the *latent period*, varies, according to the observations of Thomson, from seven to ten weeks. He found it to be seven weeks in the case of a number of children who had been removed in a state of good health from a mountainous situation to a sugar estate; and in cases in which he produced the disease artificially by the application of yawey matter, the eruption appeared in one case in seven weeks, in another in six weeks, and in a third in nine weeks. On this account he regards the case of the patient of Dr Adams as doubtful, as there is no instance known in which the disease can be so long latent as ten months.

Bryan Edwards, the eloquent historian of the West Indies, states, that he was informed by a black woman from Annamabos, that the natives of the Gold Coast give their children the yaws by inoculation; and she described the manner of performing the operation, to be making an incision in the thigh, and introducing some infectious matter. Upon asking her what benefit they expected from this practice, she answered, that, by this means, their infants had the disorder slightly, and recovered speedily; whereas by catching it at a later time of life, the disease, she said, "got into the bone." According to Dr Winterbottom, however, this practice is totally unknown to the natives round Sierra Leone. Dr Thomson performed numerous experiments by inoculation of yawey matter in Jamaica; but the general result was, that the disease communicated in this manner was neither shorter in its course, nor milder in its symptoms. The assertion of Mosely, therefore, that inoculation of yaws was successfully performed, was made on insufficient knowledge, and without attention to the actual fact.

The negroes, especially the old women, in the West Indies, believe the children produced by women who have laboured under yaws during pregnancy are ever afterwards secure from the disease. This is doubtful; Dr Thomson saw a child who had been born of a yawey mother inoculated with fresh active matter without any result. He also endeavoured to ascertain whether the disease was actually communicated by a mother to the infant in her womb, but without obtaining satisfactory information.

V. DIAGNOSIS.—Yaws are liable to be confounded with the secondary or cutaneous symptoms of syphilis, with siveens, with the Arabian leprosy, with radesyge, pellagra, and the red leprosy of Cayenne. From these diseases it will be easily distinguished by the history of the case, by the mode in which it has appeared, by the locality in which it is prevalent, the individuals whom it attacks, and above all, by the peculiar fungous growth to which its pustules give rise. Though Dr John Hunter saw it affect European soldiers, yet since it takes place principally in negroes, it will rarely be difficult to decide on the nature of the eruption. Time, patience, and observation, with the usual precautional measures of seclusion, will always succeed in at length determining the true nature of the disorder.

The diagnosis of this disease, however, has given rise to a

more difficult task. Sprengel and Kunsemuller have drawn a distinction between yaws and pians in the following manner.

Yaws resembles small-pox though chronic, and is endemial not only in Africa and the West Indies, but in the East Indies. Pians is indigenious on the coast of Guinea, and is peculiar to the negroes. Yaws begins with pains of the bones; whereas pians commences with itching of the skin. The eruption of yaws resembles that of small-pox in being pustular and secreting purulent matter and fungous masses; while the eruption in pians is vesicular, and causes the secretion of serous fluid. In yaws the hairs round the pustules become gray; but in pians they undergo no change. The eruption of yaws is cured by the efforts of nature, but that of pians does not admit of spontaneous cure. Yaws may terminate in true caries of the bones, whereas pians merely renders the bones soft. Pians is also said to pass into the red leprosy of Cayenne (*Boacia, Sauauas*), which is not observed in yaws.

VI. TREATMENT.—The treatment of yaws, notwithstanding the assertions of Mosely, has been much misunderstood by European practitioners. The history already given is sufficient to show that the disease has, like the effects of other morbid poisons, a definite course, which can neither be checked nor much retarded with safety by any medical contrivances. Notwithstanding this obvious principle, it has long been the fashion with many practitioners in the West Indies to administer mercury in large and numerous doses till salivation took place; and too often this method of treatment was carried on by wholesale by proprietors of slaves, overseers, and other unqualified persons. The effect of this, when the mercury is given, as it usually was, early in the disease, is, first to cause the sudden disappearance of the eruption, and afterwards to induce a broken or declining state of health, accompanied with dropsy, general wasting, and sometimes the formation of incurable ulcers in various parts of the body. A very common result is deep-seated pains and the bone-ach (*dolores osteocopi*.) In such circumstances, a relapse is the most favourable event that could be wished for; but it too often occurs in the form of a crop of bad watery yaws, which are tedious in their progress and doubtful in their issue. But the worst effect of mercury in the treatment of yaws is, that it uniformly calls

into action any disease to which the individual may be disposed. In this manner, king's evil in various forms, leprosy, and even cancer are said to be produced in the persons of those in whom the yaw eruption has been treated by mercury.

By others mercury has been administered with more judgment, it is supposed, towards the height or the conclusion of the disease. When the progress of the pustules is at a stand, it is believed that this remedy is useful in expelling the remains of the poison, preventing the deep-seated tissues, as the periosteum and the membranes of the nose and throat, from being affected, and accelerating the restoration of health. Thus Bancroft recommends mercury and camphor with sudorifics, to determine to the skin without sensible evacuation; and Dr Schilling recommends corrosive sublimate and decoction of the woods in the latter period of the disease, when there are deep-seated pain of the bones aggravated at night. Dr Wright, believing that yaws produce ulceration of the nose and throat, and knotty swellings of the periosteum, as in syphilis, asserts that the most powerful remedy for curing such inveterate disorders are corrosive sublimate with guaiacum and sarsaparilla. Lastly, Kunsemuller, who represents mercury on the ground of ten years experience to be of singular efficacy, was in the habit at first of giving corrosive sublimate, after the manner of Van Swieten, dissolved in rum; but at a later period of his practice, he used a solution of mercury in nitrous acid, at the rate of three or four drops twice daily, in combination with guaiacum and other sudorifics. These therapeutic precepts are founded on notions of the disease, which, if not erroneous, are by no means ascertained. It is not established that yaws produce the inflammation and ulceration of the fibro-mucous membranes, which Dr Wright and others have believed they did; and although this were established beyond doubt, we know well that mercury could not cure such effects.

It is, however, gratifying to find, that with medical men the practice of exhibiting mercury to yaw patients is fast diminishing; and, according to the account of Thomson, they are beginning to be convinced that, like most morbid poisons, it must have its period of growth, maturity, and decline, whatever remedies be used. Correct views of this disease, indeed, show that it should be interfered with as little as may be; and that

the business of the medical attendant is limited to the duty of rendering the progress of the morbid processes as little painful, and as little distressing as possible. With this view, the practice now generally adopted in Jamaica is to leave the disease to the efforts of nature, to feed the subject with light but nutritious food, to shelter and clothe him, so as to obviate or prevent the effects of weather, which are generally injurious, and relieve him from all laborious or fatiguing work. In weakly or exhausted subjects, especially children, towards the conclusion of the disease, remedies that act at once on the cutaneous circulation and discharge, and in the function of the alimentary canal, are very useful. Of this kind decoction of the woods, polychrest salt, flowers of sulphur, occasional antimonials, but, above all, the warm bath, will be the most appropriate remedies. Local remedies do not exercise much effect.

In Africa the natives never attempt to cure the disease till it has nearly reached its full height, which is believed to be when pustules cease to appear, and the yaw granulations have acquired their full size. One of their remedies is the bark of a tree called *Yuffo* by the Bulloms. This is boiled in water, and made stronger or weaker according to the age of the patient; some of this decoction is mixed with rice and given for two succeeding mornings, and after omission for a week it is again exhibited two mornings successively. It proves gently purgative. The sores are likewise washed every second day with a strong decoction of the same bark; and the crusts are afterwards carefully removed. The infusion of the bark of the *bullanta* is used for the same purpose. Another African remedy for yaws is the juice which exudes from the cut stem of the *nintee*, taken every morning in the quantity of a glassful. It is astringent, but produces no sensible effects. A decoction of the leaves of this plant is used also as a local wash.

To destroy the mother yaw the most frequent application is lime juice and iron, which is applied in two modes. The iron bar is made red hot and rubbed with a lime cut in two, the boiling juice of which falls on the sore, producing extreme pain; or iron is boiled in lime juice with a quantity of the common black ants, or a proportion of Malaguetta pepper, and the liquor thus prepared is applied hot. In either case there is produced on the surface of the sore, a crust which is removed every second day.—(Winterbottom, Vol. ii. 156, 157.)

Dr John Hume, the anonymous author of the paper in the Edinburgh Medical Essays, and after him Hillary and Adams, regard yaws as the same with the disease described in the thirtieth chapter of Leviticus, as the Jewish leprosy. The last author has taken considerable pains to establish the identity. Thomson, who certainly was familiar with the appearances of yaws, considers the attempt unsuccessful, and thinks the chapter alluded to requires more ingenious explanation. I do not think that the description in the sacred writings is sufficiently minute and precise to furnish evidence adequate to a satisfactory comparison.

§. IX. Sibbens. Sivvens.

An Account of a very Infectious Distemper prevailing in many places, by Ebenezer Gilchrist, M. D.—Essays and Observations, physical and literary, &c. Vol. iii. Art. xi. read 1765, Edinburgh, 1771.—Dissertatio Medica Inauguralis de Syphilitide Venerea necnon de Morbo Sibbens dicto, &c. auctore, Adams Freer. Britanno. Edinburgh, 1767.—Cases in Surgery, &c. to which is added an account of the disease called Sibbens, by James Hill, surgeon in Dumfries, 12mo. Edinburgh, 1772.—Observations on Morbid Poisons, chronic and acute, 2d. edition, by Joseph Adams, M. D., F. L. S., &c. London, 1807, Chapter xv. of Sibbens.

It was at first matter of doubt and consideration whether it was consistent with principles of pathological distinction to arrange Sivvens with cutaneous inflammations. But as both the vulgar and even professional persons admit considerable resemblance between yaws and its appearances, and as it could not have been so conveniently placed in any other situation, it was further determined to introduce it in this place for the following reasons. *First*, it is agreed among all those who have observed it, that it invariably commences on the skin, and when it attacks other tissues, it is not, by passing abruptly to them, as *syphilis*, but continuous or successive spreading; *secondly*, it begins either with vesicles or pustules, and forms at length ulceration of the corion: *thirdly*, it agrees with several other diseases, the effect of morbid poisons, which affect first the skin and mucous surfaces, and then other textures simultaneously.

The first description of sibbens given by Dr Gilchrist is still the most minute and the most perspicuous, and shall form the basis of the following account. The commentary of Dr Adams is not in every point a clear or just exposition; and appears in some respects to be modified by his pathological and speculative views.

According to Dr Gilchrist, the first appearance of sибbens is in the form of sore throat, or inflammation of the palatine *velum*, *uvula*, and neighbouring parts. The tonsils are often superficially ulcerated, being either raw and red, or covered with a white slough. In many cases, a small pearl or whey colouring rising of the skin appears at the corners of the mouth, the roof of which, and the inside of the cheeks and lips, become covered with white specks and sloughs, or the usual appearances of thrush (*aphtha*.) In other instances, without thrush or sore throat, a small red excrescence or fleshy sprouting like a rasp appears at the corners of the mouth, and is regarded as a sure sign of the disease. As these appearances, all of which denote inflammation of the mucous membrane of the mouth and throat, spread, the patient becomes hoarse, or is prevented from swallowing without much pain; and in some instances, the tip of the throat (*uvula*) is destroyed. In such circumstances, infants at the breast perish with hunger, from inability to suck or swallow. The submaxillary glands may be swelled.

Hill represents the first appearance or stage of the disease to depend on the mode of communication. "When the infection is not immediately received by the mouth, the sore throat is a consequence of an universal taint in the blood; in which case the first redness and hoarseness is not easily distinguished from a slight stuffing by a common cold; but when these symptoms are the effects of cold, they are either soon discussed, or bring on inflammation accompanied with quick pulse, which is not the case in sибbens;—for in healthy or cold constitutions it sometimes continues for weeks, nay, months, without any great change. But when the infection is communicated by a foul pipe or spoon, the angles of the mouth, the lips, gums, &c. are first affected. The first appearance of an ulcer on the lip exactly resembles a bit of fine, white soft velvet pasted upon the skin; for it will not wipe off. But after it has eaten in for some time, it then has the appearance of a piece of red skin cut out, and a white velvet patch put in its place. These ulcers spread broader than deep; and the whiteness always continues more or less till the cure be completed, being sometimes as bright as the whitest paper, but more frequently yellowish." (Cases in Surgery, by James Hill, &c. page 257, 258.) These appearances Adams regards as the same with the small pearl or whey-

coloured rising of the skin mentioned by Gilchrist in the same situation ; and he concludes in general, that the primary local action of sibbens is either *phagedaena* with all the rapidity that attends that ulcer ;—or increased and altered secretion, with inflammation sometimes so violent, as to produce effusion of coagulated lymph, forming a white speck usually called a slough.

“ In sibbens,” says Adams, “ the appearance is very early pustular, though I never could detect *pus* under the cuticle.” He means to say that, in the beginning or early stage, the disease appears to be pustular, though matter is not found. This does not show that it is not actually pustular,—but that the pustules are chronic, and do not readily suppurate.

In a more advanced state, it appears in the form of small pustules or dirty-coloured blotches, which breaking leave a dry crust, penetrating by deep ulceration into the adipose membrane, with blueness of the neighbouring skin. These pustules, which occur chiefly in children, occupy the belly, groins, and flanks, sometimes the face. The progress of the sores in which they terminate, is slow, and they are seldom larger than the tip of the finger or thumb ; in shape long, round or irregular ; with clean surface, and slightly inflamed edges. They may coalesce and spread, converting the whole surface of the belly below the navel into a large foul ulcer, with a peculiar and fetid odour. On the breast and face appear smaller sores, covered with a purulent slough, continuing without pain or redness, and seldom becoming larger. The same appearances, but in more violent degree, may occur in the scalp. This is evidently described as a more advanced stage of the disease ; but whether it ever occurs without previous affection of the throat, we are not informed.

A form believed to be more severe is the following. Boils appear in different parts, the arms, shoulders, face, legs, and feet, and suppurating form sores, which penetrate to the muscles by ulceration, and seem to consume these organs superficially. These sores are of various size, some very large, others small, of a high red colour, without matter, except a little watery fluid (*ichor*,) exquisitely painful and tender, and with hard ragged edges. They must be distinguished from cancerous sores.

The *alae nasi* may be destroyed ; the bones of the cheeks and nose (*ossa spongiosa*, *ossa nasi*,) may be affected and discharged carious ; the gums and alveolar processes may be destroyed

by ulceration, and force the teeth from their sockets. The large and solid bones were not known to be affected.

When Sibbens affects the skin only without penetrating deeper, it appears in sundry shapes. The whole surface of the person may be mottled or flecked by a dusty copper, or dirty-red colour. In infants and children, broad red patches, with painful swelling as large as the palm of the hand, appear on the trunk and limbs; a cluster of small pustules succeeds; the skin becomes dry, and the cuticle peels off, leaving a new tender cuticle beneath; and this may happen many times, sometimes in one place, sometimes in another. Scabby eruptions may appear on the scalp, brow, inside of the thighs, groins, and contiguous parts, with hardness in the skin, and troublesome itching. Redness, soreness, and excrescences, (*condylomata; cristae,*) round the fundament are frequent. On the breast, shoulders, and other parts, an eating tetter (*herpes exedens,*) may appear, breaking out in one part, while it heals in others, with considerable deformity.

When it appears on the face, it assumes the form of numerous small hard knots or *tubercles*, resembling complete small-pox in shape and size, but of a reddish colour, and with much heat and swelling. These may either suppurate or be gradually resolved. In others, there is simple swelling without tubercles, and the scarf skin is thrown off from time to time in fine white net-like flakes. From small bright red spots, tubercles or eminences redder than those already mentioned arise, and coalescing in some places form a flat smooth elevation, which then becomes of the usual colour of the skin, and may undergo slight ulceration.

A form of the disease, though not observed by Gilchrist, yet sufficiently common in other places, is the following. An itchy round tetter or ringworm breaks out, and afterwards becomes raw, not scabbing, but discharging by exudation an ichorous fluid. In a short time, a *fungus* or red spongy substance, much like a rasp or strawberry, sprouts up one-half above the surface of the sore; and when fully formed appears to be set in an excavated hollow cut in the flesh, exactly to receive it. In other instances, the sore is covered with a black scab, except at the edges, where there is a circular crack or ring, like the line of separation between mortified and sound parts; from which the same sort of fluid is constantly oozing. By degrees, the

crack enlarges towards the middle, and the scab pushed off gives place to the spongy substance (*fungus*) already mentioned. In other cases, again, these spongy growths succeed a dark or gray scabby patch. The parts being itchy are made raw by scratching, and the fleshy growth is allowed to sprout.

Sores of this description occupy every part of the body, and many are seen at the same time in the same subject. But the excrescences are not always formed; and they appear to be more frequently produced in the sore that never scabs, than in those which are scabby or scaley. They are rather indolent than tender to the touch, and in colour do not differ from the growths of other sores. Their characteristic appearance, however, has been the original of the popular name of the disease. Sivven in the Celtic is said to be the name for a wild rasp; and this disease, in consequence of the berry-like growths which at length appear in it, has been named the *Rasps* or *Sivvens*.

In the above description I have adhered substantially to the account of Dr Gilchrist, unless where the internal evidence with personal knowledge, furnishes reason to believe that he had not accurately distinguished the several stages or periods of the disorder, and the peculiar characters which it assumes during these stages. Gilchrist indeed, remarked, that it has a first appearance, and talks of it "acquiring greater strength, and affecting more the habit." Adams and others have spoken of the primary and secondary or the local and constitutional symptoms of Sivvens; and have in this manner, perhaps, been led too prematurely, to establish a comparison between its phenomena and those of *syphilis*. Without adopting this view of the pathological action of sibbens, I think it more accordant to the progress of the disease to divide it into two stages or periods; the first, in which it generally induces a local action; the second, in which it affects the skin with various eruptions.

The first stage is described above, nearly in the words of Gilchrist, as an inflammation of the mucous membrane of the lips, or mouth, or throat, together or successively terminating in vesicles, sores, and ulceration, which Adams ascertained to be phagedenic. This action he does not define well. In the cases which have fallen under my own observation, either the lower part of the *uvula* was undergoing a process of ulceration without much discharge, or a sore or sores appeared in the *velum*,

which was consumed in the same manner. The character of this ulceration is the following. The parts are red, clean, and raw, not much swelled; the sore or sores are irregular in shape; their edge clean, sharp, and well-marked, as if cut with a sharp instrument, sometimes excavated; there is little or no discharge, and what is secreted is a thin blood-coloured serum. The painful sensations which attend this process vary according to the temperament of the subject; some make little or no complaint, others have a sensation of rawness, tenderness, and of cutting in the parts. I have seen the greater part of the soft palate (*velum*,) converted into a large ulcerated hole, sometimes a fissure, always with sharp and excavated edges, or even the *uvula* and part of the palate consumed in a young girl, without appearing to be the source of much uneasiness unless when speaking or swallowing.

Gilchrist does not speak so clearly of those symptoms which might be referred to the second stage of the disorder. Adams thinks that the boils of the arm, and legs, which terminated in destructive sores, were primary symptoms, or belonged to the first stage of the disease. From want of specific information, and because these phenomena are not commonly seen in sibbens as it now appears, it is impossible to say whether this view be correct or erroneous. I am inclined to think, that in every instance the second stage of sibbens consists in inflammation of the corion, which may produce copper-coloured, or bluish, or red blotches and spots, psudracious or favose pustules, hard acute pustules (*phlyzacia*,) chronic pustules, (tubercles of Willan,) or even hard masses of confluent pustulated skin, according to circumstances of constitution, exposure to cold and moisture, or bad food, filth, and other accessory yet aggravating causes. These appearances indicate the proper action of the morbid poison of sibbens whatever it be; and this was confirmed by the observations of Adams in the cases which he examined personally.

With regard to the berry-like growths which occurred in the Sibbens of the Highland districts, it is difficult to give a positive opinion. They do not appear to have been noticed by recent observers as characteristic of the disease, or even as occurring in its course. Adams, without entering into the question with much care, seems to think that the resemblance is remote, and that the name may have been derived from some

other disease of the Highlands in which the similarity is greater ; or that the term Sibbens may in that part of the country be applied to any eruption with scabs. “ I am the more inclined to one of these opinions, because neither of the writers who have had the largest opportunities of seeing the disease, nor the present practitioners whom I consulted, insist upon this appearance. So little is the name regarded in Dumfries-shire among the poorer class, with whom one might expect the ancient language to be most familiar, that the only term they are now acquainted with is *Yaws* ; a word they must have derived from such sailors as have returned from the West Indies.” (Observations on Morbid Poisons, p. 193, Chap. xv.)

The conclusion from this is, either that the berry-like growths described by Gilchrist, from the report of other observers, belongs to a different disease altogether, or, if it occur in sibbens, it is accidental and accessary.

Sibbens is endemial in Dumfries-shire, Ayrshire, and Galloway, appears occasionally in Perthshire and Aberdeenshire, and cannot be said to be entirely extinct in the Western Highland districts of Scotland. A similar disease, it is said, has been observed in the Bay of St Paul in Canada. Its formation depends on contagious matter, and it may attack the individual as often as he is exposed. It is propagated only by actual application of contagious matter, either to the exposed corion, or to those parts where the cuticle is thin, as the lips, penis, nymphæ, &c. ; or by exposure or close contact to the cutaneous secretions of a person whose skin is already affected with sibbens. It is propagated by using the same spoons and knives, or the same cloth the infected have used without washing them ; drinking from the same cup or glass ; smoking with the same pipe ; sleeping with the infected, or the bed-clothes which they have used ; handling their sores without afterwards washing ; sucking or giving suck ; saluting or kissing ; and fondling children, or feeding them in an uncleanly way. It is supposed, also, that the breath of the infected is not without danger.

But although sibbens be thus easily communicated, it is certain that attention to cleanliness will always prevent its operating on the exposed. Avoiding the filthy habits of common spoons, drinking cups, or pipes, or of saluting, kissing, or sleeping in the same bed-clothes, will always prevent its communi-

cation ; and in cases where the exposure has unguardedly taken place, or there may be reason to think that poisonous matter has been applied, sedulous washing will seldom fail to prevent its morbid operation.

A curious and very useful inquiry would be to determine whether siccus be ever communicated so as to produce its general effects without local operation ;—whether it ever taints the constitution, as it is termed, without previously forming sores, or producing other local changes at the spots at which its poison has been applied. None of the writers who have treated of siccus have adduced any facts which would justify positive conclusions on the point ; and the subject does not appear to have occurred to their consideration. In the present state of knowledge, I am inclined to think it never enters the system without producing local effects more or less distinct. But it will remain with those, whose opportunities of observation are more extensive, to ascertain whether this be uniformly the case. Are there any examples of the cutaneous inflammation of siccus occurring without positive proof of no local affection ?

It has been long known that siccus yields readily to mercury. Salivation, however, is not requisite ; and tenderness of the gums, merely to show the operation of the medicine, is all that is needful. It may be given either in the form of pill, inunction with the ordinary ointment, or by grain-doses of calomel, either alone or combined with opium or with antimony. When Dr Adams was at Dumfries, Dr Maxwell was in the habit of administering the remedy by making the patient inhale the fumes from a heated iron through the tube of a gun-barrel. This produced a great effect, with little trouble or waste of the mineral. After the mercury operates on the system, it is supposed to be advantageous to exhibit diaphoretic and alterative medicines. With this view, Gilchrist gave the aethiopic pill (*Pilula sulphureti hydrargyri nigri*,) sarsaparilla, and the decoction of the ordinary burdock (*Arctium lappa*.)

Though I here state the ordinary method of treating siccus, and the remedies which all practitioners familiar with the disease employ, I am not certain that the exhibition of mercury is indispensable to the extinction of the disease. I am not aware that its natural history has been so attentively and fully explored, as to show that the cutaneous pustules or sores will not heal of themselves without leaving other traces of the

disorder. The analogy, not only of yaws, but of *syphilis*, and many other diseases which are the effects of morbid poisons, would lead to the conclusion that they might; and it is curious that Adams, when he recognized the truth of this law, and applied it to the treatment of these maladies, did not reason in the same manner with regard to the curative management of sibbens.

I have here stated one question which appears to require investigation, and which ought to be determined by the results of several authentic and well-marked cases of the disease. A second question which is suggested to the pathologist is, whether mercury really and truly cures sibbens? The same principle to which I have already alluded, and the truth of which is admitted by Adams, would lead to a similar conclusion. If the poison which produces sibbens be of that nature that it must run a determinate course, in what respect can any remedy, and, above all, mercury, which in most instances acts itself as a poison to the animal body, and disorders all the functions and vital actions, prevent the developement of the symptoms, shorten their course, or arrest their progress? Many instances must have occurred sixty or seventy years ago in Scotland, in which sibbens attacked persons who neither knew the use of mercury, nor, if they had, could have used it; yet all these cases did not prove fatal, and it is probable many of them underwent a spontaneous cure. This subject, however, I admit, requires to be further investigated.

§. X. Radesyge or Spedalskhed, or Spedalska; Spetalska, Norweg. Liktraa, Island. Saltzfluss; Der Nordische Aussatz, Germ. *Lepra Norwegica*, Schwediaur. Die Marschkrankheit, Holstein.

Hempel, Nachricht von der Spedalskhed im Bergenstift Rendsburg, den 26 Julii 1781. Hensler, l. c. p. 117.—Dissertatio Inauguralis de Elephantiasi Norwegica, auctore Jona Gislesen. Hafniæ, 1785.—H. D. Buchner, Nachricht von der Spedalskhed in Bergenstift. Bergen, den 28sten, Januar 1786; and apud Hensler vom Abendländischen Aussatz. Hamburg, 1794. Excerpt, p. 110.—Afhandling om Radesygen eller Saltflod af Nicol Arbo. Kiøbenhavn, 1792.*—Underretning om Radesygens Kjendetegn, Af C. E. Mangor. Kiøbenhavn, 1792.*—Hensler Vom Abendländischen Aussatze im Mittelalter nebst einem

* The Essays of Arbo, Mangor, and Pfefferkorn, which were originally published in Danish, were translated into German, and published by Hensler at Altona in 1799, with an excellent and judicious preface; and it is to this translation that I am indebted for my knowledge of the contents of these essays.

Drei Abhandlungen von den Kennzeichen, Ursachen und der Heilmethode der Norwegischen Pest, (oder Radesyge) von Arbo, Mangor, und Pfefferkorn. Aus dem Danischen. Mit einer Vorrede, Von Philipp Gabriel Hensler, Königlich Danischen Archiater, u. s. w. Altona, 1799. 12mo.

Beitrage zur Kenntniss und Geschichte des Aussatzes. Hamburg, 1794, 12mo.
 —Anviisning til Kjende og Helbrede Radesygen 1796.—Wilhelm Georg. Pfefferkorn uber die Norwegische Radesyge und Spedalskhed. Altona, 1797.*
 —Hensler, Vorrede zu Arbo's und Mangor's Abhandlung. Altona, 1797.*—
 Bidrag til oplysning om Radesygens Natur af Joh. Carl. Mülertz. Kopenhagen, 1799.—Moeller in Tode's Medico-Chirurg. Journal, 5 Band, 1 St. p. 65.
 Munk in Tode's Medic. Chirurg. Journal, 5 Band, 1 St. p. 60. Kopenhagen, 1800.—Dissertatio Inauguralis de morbo cutaneo lue venereum consecutivam simulante. Auctore, C. F. Ahlander. Upsaliæ, 1806.—Observations on Radesyge, a disease endemial in Norway, by J. Bocker of Upsal, Edin. Med. and Surgical Journal, Vol. v. p. 420. Edin. 1809.—Dissertatio Inaug. sistens observationes in Exanthema arcticum vulgo Radesyge dictum. Auctore Isaaco Vought Gryphia, 1811, and Hecker's Annalen der gesammten Medecin 3 B. 3 Heft.
 Heequer, Kunst die Krankheiten der Menschen zu heilen. 2 Theil. Erfurt, 1813.—Om den Ditmarsiske Syge. Af Etatsraad og Livlæge Brandis (Commentatio Regiæ Societati Medicæ Hafniensi, anno 1810, praelecta.) Bibl. for Læger 4 bd. Kbhvn, 1813.—Om de så kallade urartade Veneriska Sjukdomarne, &c. Af P. G. Cederschjöld. Stockholm, 1813.—Om Norrska Radesygen. Af Hans, Munk. Kongl. Vetenskaps Academiens Handlingar för År 1815.—Morbus quem Radesyge vocant, quænam sit, quænamque ratione e Scandinavia tollendus. Commentatio, Auctore Frederico Holst, M. D. Christianiæ, 1817, pp. 157.—
 Über die Aussartzartige Krankheit Holsteins, allgemein da selbst die Marschkrankheit genannt Von Ludwig August Struve, D. M. und Ch. Elmshorn, 1820. 8vo. p. 206.—Die Radesyge oder Scandinavische Syphiloid. Von Ludwig Hunefeld, M. D. Leipzig, 1828.

The Radesyge, Spedalskhed, Spedalska, Liktraa, Saltzfluss, or Marsh Sickness, is a disease endemial in various parts of Scandinavia and the north of Europe, beginning with fever and catarrhal symptoms more or less violent, and terminating in an eruption of pimples, scales, patches, and tubercular pustules on the skin, and patches of the mucous membrane of the nose and throat, terminating in puriform discharge, with or without ulceration.

The Radesyge or Northern Leprosy is generally distinguished into three stages, the first incipient, latent, or occult; the second evident, eruptive, or cutaneous; and the third, the confirmed, ulcerative, or cachectic.

The incipient stage may be so completely latent or occult, that its existence is betrayed by almost no perceptible symptom of disordered health; or the symptoms are merely slightly impaired appetite, a little dry cough, and wandering pains in the limbs, which are ascribed to catarrh or rheumatism, in consequence of exposure to cold and moisture.

In other instances, however, the incipient stage gives rise to unequivocal symptoms, resembling, nevertheless, a common febrile attack, occasioned by exposure to cold, moisture, or excessive fatigue. The patient complains of an itching sensation in the skin, weight and flying pains in the limbs, stiffness in the joints, difficult respiration on ascending stairs or an acclivity, ten-

sive pain of the frontal region, unusual aversion to exertion, and sudden faintness on the most trivial corporeal effort. Though these symptoms are the more insidious, that they in general actually appear after exposure to cold and moisture or unusual muscular fatigue, yet they differ widely in this circumstance, that they do not, as in other cases, subside after they have continued for some time. On the contrary, after some days or even weeks, especially if the patient be plethoric, the countenance assumes a remarkable red colour with a glossy aspect, or, if it retain the pale colour, has a silvery glistening appearance, and is the seat of an extraordinary and insufferable sense of heat. At the same time the external surface of the nose becomes red and swelled, and its inner membrane begins to swell, causing stopping of the nostrils and impeding respiration; the *uvula* and tonsils are swelled and relaxed so as to communicate the sense of a foreign body in the throat, to render the voice rough, hoarse, and nasal, and, with the contracted state of the nostrils, to occasion great difficulty in breathing.

It is not uncommon for the patient at the same time to suffer wandering pains of the joints, imitating those of rheumatism, which are aggravated in the night, and towards morning undergo a temporary relief from a copious, viscid, and something fetid discharge from the skin.

In this condition, according to Schnurrer, the patient may continue for years, when no particular cold or other external accident accelerates the further developement of the disease.

The assemblage of symptoms now enumerated constitutes the latent or preliminary stage of the disorder. They are nearly uniform in both sexes, at all ages, and in every variety of locality in which the disease prevails.

In females, though the *catamenia* are often regular in period, sometimes they are irregular, occasionally too profuse or too scanty, and sometimes more frequently or more seldom than natural.

The nature and intensity of the symptoms of the second, manifest, or eruptive stage of the disease are much influenced by the treatment employed, by the circumstances in which the patient is placed, and by physical agents in general. In situations in which the patient is sheltered from cold and moisture, commits no great errors in diet, and is seasonably subjected to methodical treatment, the eruptive stage may be protracted for months

or even years; and, from what is stated by Dr Struve on this point, it may be sometimes wholly prevented.

In ordinary circumstances, and where little care to avoid errors in diet is observed, in the course of a few months, sometimes in the course of weeks, especially if the season be cold and damp, the skin begins to be covered with scales, itchy pustules, or furuncular tubercles, which are in different periods converted into ulcers. In the majority of cases this eruption appears first on the face in the form of variegated patches, scarcely exceeding the bites of gnats in size, a little elevated at the margins, sometimes disappearing, but recurring in damp weather, and generally less sensible than the surrounding skin, sometimes so much so, that, when punctured, they are not painful. When these spots are broken, they either effuse a viscid fluid, and are quickly covered with scaly crusts, or they corrode the neighbouring parts, and generate, not unfrequently, incurable ulcers.

From the general description now given, two deviations are remarked.

1. In one class of cases, a dry efflorescence, which has been imperfectly described under the name of herpetic, is observed to cover almost the whole skin. This, which is at first in distinct patches, soon becomes confluent and whitish like flour or bran; and when this scurfy layer is removed, the skin appears denuded of its *epidermis*. The latter, however, being soon regenerated, though unequally, and in a morbid form, renders the skin thick, inelastic, rough (*squarrosa*,) and insensible.

2. In another class of cases, a copious scabby efflorescence, which appears, from the description of Holst, to be of a papular character, somewhat humid, and intolerably itchy, terminates after different intervals in the same manner, by altering the cutaneous texture.

Whether the first external indications of the disease be wheals (*maculae*,) scales, or pimples, they are speedily accompanied or followed by many small knotty bodies or tubercles, sometimes of a copper, sometimes of a leaden colour, first of the size of a leaden-drop or a garden-pea, and moveable under the skin, afterwards larger and more fixed. These tubercles occupy first and most abundantly the face, viz. the eyelids, nose, cheeks, chin, lips, external ears, and then the rest of the person; and in this distribution, the skin of the face is not only sooner,

but more seriously and completely diseased than that of any other region. The skin of the forehead becomes thickened, wrinkled, and puckered; the eyelids are swelled, inverted, and surrounded with a rose-coloured or dark leaden circle; the cheeks are swollen, and of a dark-red colour; the lips become thickened, indurated, and retracted; the muscular cartilages are convoluted; and the whole countenance assumes an expression at once frightful, hideous, and pitiable. This disorganizing process is not, however, confined to the facial skin. In the mucous covering of the *uvula*, the palatine velum, the tonsils, and the fauces generally, the same or analogous changes take place. These parts are occupied with spots, pimples, or tubercles, which first produce separation of the mucous epidermis, and then pass into bad ulcers. A similar state of pustular or tubercular inflammation and ulceration takes place in the nasal mucous membrane.

The formation of the tubercles, and the transition of these and the pustules into ulcers, indicate the commencement of the third stage.

The tubercles of the skin having continued for some time to form scales and crusts, gradually increase in size, and ultimately assume the ulcerative process, providing the life of the patient be protracted a sufficient time. These ulcers, the margins of which are hard, callous, swelled, and irregular, secrete a reddish acrid fluid, with a fetid odour like that exhaled from the perspiration of the feet, and destroy the surrounding parts, but are more frequently covered with scaly crusts, whitish, brownish, or reddish; and the intermediate spaces of skin are either marked with wrinkles, furrows, and fissures, and divested of hair, or become as hard as leather, and so insensible, that, according to some, the puncture of a needle cannot be felt. As this eruption on the skin is fully established, the intense pains of the joints are mitigated, and sometimes cease entirely, as soon as the disease affects the cutaneous surface thoroughly; and hence some physicians have not unreasonably regarded this affection of the skin as critical.

When this disease attacks robust constitutions, as is not unfrequently the case, it appears, at the period now specified, to make little impression on the general health. In feeble constitutions, impaired appetite, flatulence, and other symptoms of impaired digestion, take place. A serious nervous affection, appearing in some in the shape of increased irritability, in others,

in that of great insensibility, and an incomprehensible indifference to their own perilous condition on the one hand, and a gloomy disposition of the mind on the other, are almost uniform symptoms of this and the subsequent period of the disease.

As the disease advances, while the crusts and tubercular patches of the skin form new ulcers, the ulcers already formed enlarge, and penetrate more deeply, so that, after affecting the skin and adipose tissue, they attack muscles, membranes, and bones. The ichorous discharge meanwhile exhales a singularly fetid and offensive odour, and as it becomes more sanguinolent, it seems to form on the ulcers fleshy, fungous, and spongy masses, which are thrown off from time to time from their surface.

In like manner the patches and pustules of the mucous membrane of the nostrils and throat proceed to form crusts, which separating, disclose foul fetid ulcers; and as these spread, not only are the palatine *velum* and the *uvula* perforated and destroyed by ulceration, and the tonsils are in like manner destroyed, but even the osseous palate, the *vomer*, and the nasal bones and cartilages are perforated, and at length more or less completely destroyed by ulceration. These changes render the voice nasal, and at length completely indistinct and inarticulate. The hair of the head and eyebrows in the meantime are shed. In some instances the ulcers, after inducing caries in the phalanges, cause one or more of these bones to drop off.

In the meantime, it is remarkable that the appetite is not impaired. In some instances it is increased to an incredible degree, and forms perfect *bulimia*; the thirst is intense, incessant, and almost unquenchable; the patient complains of burning heat, especially in the evening; and towards morning he is bathed in profuse unctuous sweats. Colliquative diarrhœa ensues; the flesh is wasted, and the strength fails; and after some time of these hectic symptoms, the patient, progressively attenuated, breathes his last amidst the symptoms of well-marked *Marasmus*.

The blood at the commencement of Radesyge is covered with a thick buffy coat, which sometimes has a yellowish, sometimes a greenish or blue colour, and is so tough, that it can scarcely be divided by the knife. The serum is turbid, and yellowish or greenish. The clot beneath the buffy coat is black and

loose, and emits a disagreeable odour. In the progress of the disease, its coagulability is impaired; and the clot floats like fat in the serous fluid.

This disease, though cutaneous and eruptive, is nevertheless remarkable for affecting the cephalic and facial regions of the mucous membranes.

Radesyge is endemial in the sea coast districts of Scandinavia, Norway, Iceland, and Greenland, and in the Feroe Islands.

Radesyge in all these situations is believed to be a contagious disease, communicable by perspiration, saliva, or the fluids secreted by the sores. Besides this essential cause, however, other accessory causes must co-operate, as it appears that the contagion does not uniformly affect all who are exposed. These accessory causes are referable to the heads of climate, local position, and physical qualities of the country, the mode of life observed by the inhabitants, and similar circumstances.

With regard to climate, it appears that the cold, damp, and inclement weather of Scandinavia is peculiarly favourable to the production of this disease. That mere humidity, however, or a sea coast residence, is not sufficient to give rise to Radesyge, further appears from the fact, that it prevails in Tilemark, Leerthal, Oesterthal, Gulbrandsthal, and other inland provinces of Norway, as well as in the maritime districts.

It must be observed, nevertheless, that the physical and topographical characters of the districts in which this disease is most prevalent, show that its prevalence must be closely connected with these circumstances. Thus its occurrence in Holstein, and especially the Dutchy of Sleswick and the Ditmarsh territory, shows that a low damp situation, in which the air is habitually charged with moisture, is more than usually favourable to its occurrence and propagation. The low level character of the surface, intersected by the Elbe, Eidore, and several of their tributaries, and the extensive line of sea-coast, are regarded by Struve as particularly favourable to the development of the disease.

The mode of life is represented to be highly favourable to the production of the disease. Thus it is remarked, that in Norway, where most of the working population are engaged in the laborious duties of mining, cutting wood, and glass-making, or smelting ores, they are often overheated, and in this state exposed to the deleterious influence of an atmosphere habitually

cold and moist, are liable to various disordered states of the skin and mucous surfaces, and perhaps the fibrous membranes.

Holst further attributes to the nature of the food principally employed by the inhabitants of these regions great influence in producing a disposition favourable to the formation of radesyge. This food is represented to consist chiefly of the oily fishes with which the coasts abound, which are either indurated, or imperfectly cured, or half putrid, so that in either case they must be innutritious or positively hurtful. To this, he adds, that the want of frequent and abundant supplies of fresh vegetables must also concur in producing the same effects.

Lastly, the low damp hovels of the working population of Scandinavia are further supposed to be extremely instrumental in favouring the production of foul diseases of the skin. The coldness of the climate, and the love of heat, oblige them to keep their windows closed; and hence, want of ventilation in smoky cabins operates in conjunction with the causes already specified in impairing health.—(Holst, *Commentatio*, Cap. ii. p. 67–82.)

Radesyge is to be distinguished from syphilis, scurvy, itch, and impetigo. According to Hensler, it makes a near approach to the leprosy of the middle ages. This, however, is very doubtful, and more difficult to be made the subject of precise conclusions, that we are imperfectly informed as to the character of the leprosy of the middle ages, and that all that we know is, that almost every foul disease of the skin was in these periods of ignorance referred to the head of leprosy.

On the treatment of radesyge, the opinions of practitioners have varied. But perhaps the therapeutical views laid down by Struve are, on the whole, the most rational. These proceed upon the principle of abating inflammation, and counteracting its effects, and improving the secretions by a more nutritious and pure species of diet. Without going into details, I shall state shortly the general objects to be kept in view.

In the incipient stage of the disease, while it is still latent, as it depends probably upon causes affecting the vascular system generally and deeply, it would be well to improve the diet; to make the patient change his residence, and to exhibit remedies calculated to operate upon the secretions of the mucous surfaces, especially that of the alimentary canal, and upon the skin. Exposure to cold and humidity should be sedulously shunned. The person should be clothed in flannel. The warm-bath ought to

be frequently used ; and if the pulse be quick, and the tongue furred, with thirst, general blood-letting should be employed, and the patient should afterwards be subjected to the influence of tartrate of antimony, or some of the diaphoretic vegetable decoctions.

In the second stage of the disease, when the inflammatory symptoms in the face and facial cavities and mucous membrane make their appearance, blood-letting, cathartics, diaphoretics, and low diet are requisite, in order to subdue the inflammatory action, and counteract disorganization of the cutaneous and mucous textures.

In the third stage of the disease, when the skin is already more or less generally and deeply affected, the powers of medicine are comparatively limited and unavailing. It is proper to continue all the treatment recommended in the first stage, as flannel clothing, with the occasional use of the warm bath, shelter from exposure to cold and damp air, good, but not stimulating, diet ; moderate doses of cathartic medicines, with sarsaparilla or sassafras, and decoction of the diaphoretic woods. Struve speaks highly of the benefit of mercury, administered in the form of corrosive sublimate in various combinations. But there is the strongest reason to believe that its effects are not curative but palliative only. He always combines it, indeed, with decoction of the woods ; and probably this, if it do not give it curative powers, at least diminishes its injurious qualities. Another remedy, perhaps more useful, recommended by Struve, is sulphuret of antimony, with camphor and extract of wolfsbane. I observe, also, that he uses the burdock decoction, with liquorice and the twigs of bitter-sweet, for similar purposes.

In one case, Struve attempted to cure a case of radesyge by means of the extract of marigold (*Calendula officinalis*), and frictions with the hydrochlorate of gold on the inside of the cheeks. Unfortunately, however, the patient soon died in a state of intense consumption, when all the sores of the throat, chin, shoulder, and arm were, under the use of this remedy, completely healed.

I have already said, that there is good reason to believe, that the influence of mercury in the treatment of radesyge is only temporary and palliative ; and of the truth of this pretty decisive proofs are afforded by the writings and reports of the

Danish and Holstein physicians. It appears, in the first place, that mercury very rarely effects complete cures; and that cures have been effected by other means. Struve mentions a day-labourer residing in the neighbourhood of the village of St Margaret's, in Marschland, who acquired great celebrity by his cures, which were accomplished by means of decoction of the woods and purgatives.

It must further be mentioned, that the Royal Health-College of Kanzeley, gives in their Report on this disease, founded on the evidence of several physicians, but especially on that of the Archiater Brandis, who in 1806 visited several villages in Marschland, and minutely examined the radesyge invalids,—several judicious inferences as to the method of treatment. After avowing that the Royal College know no individual article of the *materia medica* which possesses any exclusive operation over this disease, they conclude, that all the observations communicated, and the reports on the operation of mercury, especially corrosive sublimate and decoction of the woods, prove that this agent may mitigate for a time, the violent symptoms of the disease, but by no means prove that this mineral is adequate to their entire and permanent extinction. On the other hand, the Royal College add, all the observations concur in showing, that great attention to cleanliness, healthy food, pure and good air, not only prevent infection, but also retard the progress of the disease.

From these facts it would result, that the most likely mode of arresting the progress and counteracting the effects of the Radesyge, is to regulate the different functions in such a manner, as may bring them most nearly to the healthy standard, or in the language of the older pathologists, to attend to the due regulation of the Non-Naturals.

Of the same principle a proof not less conclusive is afforded by the fact, that Dr Ernest Henry Struve, physician in Flensburg, brother of Dr Ludovic Struve, found, after much experience, that the most uniform and efficacious mode of treating inveterate cases of Radesyge is by observing a very abstemious course of diet, or adopting what he has termed the hunger method of cure, or that by means of abstemiousness.

The history of cases of Radesyge shows, that in the confirmed stage of the disease, when the ulcers have become deep and extensive, and when the bones, either of the nose, the *cranium*, or the extremities have become carious, the disease admits of no

permanent recovery. In this hopeless state, however, Dr E. H. Struve found that the adoption of a very restrained course of diet was in many cases attended with favourable results. This method Dr Ludovic Struve had subjected to trial, at the time of the publication of his work, three times only; in two cases with complete success, and in the third case, where the nasal bones were carious, the bones were indeed healed, but the final result was still doubtful.

The object of this method of treatment consists in reducing the allowance of food to such a degree, that no more nourishment is allowed than is requisite to the mere necessary preservation of existence, in order that the morbid products may be prevented from being formed. The small quantity of nutriment which is allowed to patients, and which necessarily is fully digested, is well assimilated by the digestive organs, and is converted into sound chyle; whereas, by the daily consuming process of the body, more destroyed fluid and material are discharged than are furnished from good chyle. The consequence of the process is, that all the destroyed materials are successively entirely separated, and in their place good fluids are introduced, and health is thereby restored. This method of treatment appears to be particularly applicable to the more formidable symptoms of this disease, in which the poison has appeared in its most dangerous form, in caries and swelling of the bones.

The process which Dr Ernest Struve and his brother employed to the fulfilment of the method of cure by means of abstinence consists in the following. The patients are at first allowed to eat twice daily,—viz. at nine in the morning and four in the afternoon, and not more than four ounces of solid food each time; and for the latter meal, two ounces of stale white bread, and the same quantity of lean boiled veal or beef, are considered to be the best ingredients. Besides these solid alimentary articles, the patient takes daily for drink from one to two bottles of decoction of the woods, prepared with from two to three ounces of China root (*Smilax China*,) or burdock (*Arctium lappa*,) or some similar purifying vegetable, with from two to four flasks of water boiled to one-half. When the patient suffers much thirst, he is to take either more of the decoction of the roots, or, after using the ptisan already prescribed, he is to drink good pure water. The patient is also directed to take internally,

morning and evening, three pills, consisting of one grain of extract of hemlock, with a little soap.

From the allowance of food now specified, the diet was gradually diminished till it attained the degree of hunger. In the first days of the commencement of the system of abstinence, the local symptoms of the disease usually diminished, the ulcers lost their inflammatory character, and a more sparing suppuration was speedily followed by moderate granulation, and daily manifest improvement of the skin, while the swelling of the bones became gradually less. In a few cases from three to four weeks elapsed before evident improvement ensued. For several days after the commencement of this method of treatment, a gnawing sensation of hunger was usually felt. But this the invalid must endure patiently, and not clandestinely use other alimentary articles, in order that the cure may be successful. At the worst, the patient may assuage this gnawing feeling of hunger by a draught of his flask with the decoction of the woods. This hunger cure usually continues for six weeks' time. But it is not abandoned until all the symptoms of the disease have disappeared. The stomach is then gradually again accustomed to the use of more nutritious food; the patient is allowed to eat to half satiety of light digestible articles, as thin gruel, thin rice soup, rice flour, or the yolk of eggs; and light animal broths and soups, and gradually nutriment to satisfy the cravings of nature are given. At the same time, the convalescent continues to use the decoction of the woods from three to four weeks after giving up the abstemious treatment, with moderate nutriment, and then first returns by small degrees to his wonted mode of life.

External remedies are in this method of treatment unnecessary; but they may, especially in the case of eruptions, much accelerate the cure.

The ulcers and tubercles in Radesyge must be treated locally according to their appearance and characters. The application, to which Dr Struve is most partial, is corrosive sublimate in the form of lotion, or applied by a pencil, and acetate of protoxide of copper in the form of ointment, or that known by the name of the green salve (*unguentum æruginis*.) He speaks also favourably of the yellow-wash,—the mixture of corrosive sublimate and lime water.

I have given the preceding sketch of the method of treating

Radesyge by means of the hunger cure, because in its confirmed stage the disease admits of no other treatment, and tends naturally to the fatal termination; and too frequently patients, after lingering longer or shorter time, with foul fetid ulcers, drop into the grave in a state of miserable feebleness and exhaustion. The fact of its efficacy, as demonstrated by Dr Ernest Henry Struve, is most important in illustrating the pathology and therapeutics of several of the most obstinate and disgusting diseases of the skin and mucous surfaces. For if the cure by starvation be so beneficial in Radesyge, it may be confidently expected to be not less beneficial in Sivvens, the Cayenne leprosy, Pellagra, and other affections yet to be mentioned, and, above all, in the obstinate symptoms of secondary syphilis, and where the constitution has been thoroughly impregnated by mercury.

The effects of the method of cure by starvation further afford a most instructive and pointed illustration of a physiological principle too little attended to in the treatment of disease, and in counteracting of the effects of morbid action. In diseases and forms of morbid action which tend to destroy the organization of the textures, every fact and observation shows that we have no means of opposing or arresting the course of these disorganizing processes unless by depriving the system of the materials on which it acts. Every disorganizing process is indeed a perversion or aberration of the nutritious, the modelling, or the formative process; and in many, if not all processes of disorganization, the destruction is effected by the nutritive materials being in greater proportion than the vessels in their weakened state can properly apply, and consequently in their being deposited in improper forms and situations. The only rational method, therefore, of counteracting this destroying and perverting process, is by diminishing the materials to the powers of the vessels, and allowing no more than can be properly applied to the maintenance of the organs. In this manner, so far as can be inferred from the facts, the hunger treatment seems to operate in Radesyge. As the vessels are made by the effects of a peculiar poison to assume a perverted action which tends to destroy the organization of the skin, mucous membranes, fibrous tissues and bones, and perhaps assume this action in the effort to get rid of the poison, the most effectual mode of moderating and finally checking this action is by withdrawing the materials which it employs. When this has been done, the vessels, being no longer stimulated

beyond their feeble powers, are allowed to fall into a more languid but more healthy state. The morbid irritability is first abated and then removed. The effects of the method, in short, show that nutrition is a more moderate action than disease, and that in certain states of the system healthy action can be sustained on less copious nutritive materials than morbid action.

PROPHYLAXIS.—The great difficulty of curing this disease, when fully established, however, by ordinary means and the long time employed, have naturally led physicians to consider whether it might not be prevented and finally exterminated, and have induced the public authorities and the medical associations of the countries in which it prevails, to inquire into means by which it might be prevented from continuing its ravages among the population. The subject has been fully considered in this view by Holst, Cederschjoeld, and Struve; and the prophylactic directions which they have given may be stated in the following manner.

First, it is requisite to apprise the peasantry and inhabitants generally of the nature of the disease, of its most common causes, and of the means and methods to guard against its approach.

Secondly, it is requisite to discover all the persons who are already affected with the disease, and separate them from the healthy, and thus prevent the propagation of the disease.

Thirdly, it is requisite to employ early and radically for the affected cases those means of cure which are found most efficacious.

Fourthly, as far as is practicable, it is desirable to improve the condition of the peasantry in their houses, their occupations, and their mode of life.

For the individual measures by which it is proposed to effect these objects, I must refer to the essays of Holst and Struve, but particularly that of the latter.

§. XI. The Aleppo Evil or Mark. *Haleb Choban*, Turk. The Halebeen Disease. *Habt il senne*, Botch of the Year. *Herpes Aleppicus*; *Signum Aleppicum*. Die Flechte von Aleppo. Das Aleppische Zeichen. Il Mal d'Aleppo.

In the city of Aleppo and its vicinity, many persons are liable to be attacked on the face with a red itching vesicle, which soon forms a crust, which drops off, leaving a foul, deep, and sometimes livid scar.

It is said by Alexander Russell, Hasselquist and Schultz, to whom chiefly we are indebted for the description of this disease, that any person resident for some time in the city may be attacked with it, and that not even dogs and cats are exempt. Its production has been ascribed to the water of the place; but this seems not to be the true cause.

Russell concludes that the wisest plan is to apply no local remedy; as every thing seems to irritate and render the ulceration more deep and violent.

§. XII. *Mal de la Rosa*; Asturian Rose. *Rosa Asturica*, *Lepra Asturica*, Schwediaur.

A Journey through Spain in the years 1786 and 1787, &c. by Joseph Townsend, A. M., Rector of Pewsey in Wilts, &c. 3 volumes, London, 1791, Vol. ii. p. 10-12.—Observations de Physique et de Medecine, faites en Differens Lieux de l'Espagne, &c. par M. Thierry, Docteur Regent de la Faculté de Medecine de Paris. Deux Tomes, Paris, 1791, Tome ii. p. 136, &c.

This disease, which has been described by Casal in his Natural History of the Asturias, and afterwards by Townsend and Thierry, as endemial in that part of Spain, consists in an eruption on the skin of pimples, scales, wheals, and pustules, which afterwards form scaly crusts, with much thickening and change in the cutaneous texture, which is seamed with deep chops and fissures.

The disease commences in general about the vernal equinox, on the back of the hands or the instep of the foot, with redness, heat, pain, and roughness of the skin, which is speedily covered with rough, dry, blackish scurf or crusts. These are ejected in summer, leaving the affected hand (*metacarpus*,) or instep (*metastasis*,) stripped of crusts, and in their place reddish, shining, smooth wheals and patches, void of hair, of a deeper tint than the neighbouring skin, similar to the *cicatrices* left after burns, and which remain during the whole course of life.

At the ensuing spring, the parts are covered with new crusts, which every year become more extensive and deeper, and are accompanied with greater heat and redness and roughness of the skin. The disease may at the same time occupy both hands and both feet; and eventually it attacks, if it have not done so at first, the neck, whence it spreads down the breast by the *sternum* to the ensiform cartilage. In general this patch of rough skin is of an ashen or yellowish colour; and it affects mostly the anterior and inferior part of the neck, spreading

sometimes laterally along the course of the clavicles. It rarely appears on the back of the neck, and generally the skin over the middle of the *trapezius* muscle is left unaffected. Its appearance on the anterior part of the neck, however, and downwards on the *sternum* represents not remotely the collar of an order,—a circumstance which gives the Asturian thus diseased a painful mark of distinction among his countrymen.

The effects of this eruption on the skin are various. In all cases the skin is rough, hard, harsh, void of its usual pliancy and elasticity, red, hot, and covered with scaly incrustations; and in all cases the patients complain much of the heat and itching of the parts. In some instances, the skin is covered with a white dry branny scurf, which gives the patients the appearance of a miller. In some instances, wrinkles or the natural *rugæ* are converted into painful chops (*rhagades*) and fissures. In other instances, pustules are formed, and are eventually converted into indolent but painful sores, which discharge a foul, fetid, ichorous fluid. In all instances, after the disease has continued long, the skin becomes thick and dark-coloured, and marked with the cicatrized appearance.

It is not ascertained whether the first appearance of this cutaneous affection be preceded by febrile symptoms. But it is always accompanied with various symptoms of general disorder. The patients suffer a painful sense of heat in the mouth, the tongue is much furred, and the lips are surrounded with vesicular eruption. They complain also of a sense of extreme weakness at the epigastric region, and lassitude over the whole body, but especially in the thighs, and of a sense of oppression, listlessness, and aversion to effort. Of vicissitudes of cold and heat they are extremely sensible, bearing cold badly, and during the night they are deprived of sleep by the sense of burning heat, to which the warmth of the bed gives rise. At the same time the appetite is much impaired, sometimes completely gone; they are liable to flatulence and eructations on taking food; and the bowels are obstinately bound, sometimes with distension of the belly.

To these is added a mental affection, generally of a gloomy and desponding character. Giddiness, with temporary delirium, slight stupor, and loss of some of the senses are not uncommon. In other instances the patients are melancholy, oppressed with grief, and weep, sigh, and sob, without adequate cause, and

without, according to their account, the power of resisting. In some instances, according to the testimony of Dr Durand, this melancholy assumes a suicidal tendency, and the patients betray a peculiar propensity to destroy themselves by drowning.

The disease terminates in various modes, according to the age, temperament, and other circumstances of the patients. Most usually it ends in dropsy, in strumous tumours and affections of the lymphatic glands, and in marasmus. There is yet another termination more properly peculiar to the summer solstice. I have already alluded to the gloomy and desponding character of the mind. It is not uncommon for patients to become quite monomaniacal, to wander from home, and bury themselves in solitude, and sometimes, as already mentioned, to commit suicide. This Thierry ascribes to the brain and its membranes becoming affected by metastasis. This termination is, however, confined to a small proportion of cases.

The remote causes of *Mal de la Rosa* are thought to be found in the climate of Asturia, and especially in the mode of living observed by the inhabitants. According to Casal, the wealthy are never attacked by it; and its victims are the poor who live almost entirely on maize, which is converted into unfermented bread baked on the ashes. The want of fresh animal food and good water is also blamed; and their clothing and hovels are said to be deficient. It is observed, however, by Thierry, that in many places of the Asturias, in which the peasants live no better, they enjoy good health; and the district in which this disease prevails is not perhaps the twentieth part of the province. This shows that the *Mal de la Rosa*, like other endemial maladies, depends not on one but on many concurrent causes.

As to treatment, the disease undergoes a palpable diminution under the use of good nutritious food. The use of fresh butter internally is said to be advantageous; and a case is mentioned of a woman who recovered completely under the use of this article. Of medicines, cathartics and nitre have been much recommended. But small blood-lettings are occasionally necessary; and most of the authorities speak favourably of the use of the black sulphuret of mercury, antimony, and decoction of the woods. But under the use of mercury, it must be observed, temporary and fallacious cures only are effected.

The most rational method of treatment appears to consist in the employment of gentle but efficient laxatives, the warm bath,

antimonial, or sulphur, and the balsamic diaphoretic woods, with the local employment of carron oil, either alone or with a little citron ointment; and, perhaps the most efficient of all, the sulphurous acid vapour bath. Nutritious, though not stimulant, food is indispensable.

In many circumstances, the *Mal de la Rosa* bears so close a resemblance to the *Pellagra* of Lombardy, that I am inclined to regard them as mere varieties of the same disease. The distinction made by Joseph Frank from crusts in the *Mal de la Rosa*, and the scales in *Pellagra*, is manifestly frivolous. In all other circumstances, viz. the season at which the disease appears, the remissions during summer, and the exacerbations in the ensuing spring, with the general symptoms, the affection of the nervous system, and the tendency to mania and suicide, they are entirely similar;—and it is only requisite to compare the account of *Mal de la Rosa* by Thierry with the history of the symptoms and course of *Pellagra* given by Frapolli, Strambio, Jansen, Fanzago, Titius, Holland, and Hildenbrand, to be satisfied that they are mere varieties of the same disorder.

§. XIII. *Pellagra*; literally Rough Skin. *Pelle agra*. *Mal Del Sole*. Il Mal Rosso. *Dermatagra* of Titius.

Francisci Frapolli, Mediolanensis Nosocomii majoris Medici, Animadversiones in morbum vulgo Pellagram. Mediolani, 1771.—D. Francisci Zanetti, de morbo vulgo Pellagra Dissertatio missa a. d. 12mo April 1775, et in Nov. Act. Nat. Cur edit. Tom. vi. Norimb. 1778.—D'una Specie particolare di Scorbuto; Dissertazione di Jacopo Odoardi, 18, Luglio, 1776; et Nuova Raccolta d'Opusculi Scientifici, Tom. xxx. Venezia, 1776.—Della Pellagra Descrizione di Michele Gherardini. Milano, 1780.—Tr. Theor. Pract. delle malattie dell' insolato di primavera volgarmente dette la Pellagra. Giovan del Maria Albera. Varese, 1781.—De Pellagra Observationes, quas in Regio Pellagrosorum Nosocomio collegit Cajetanus Strambio. Regius ejusdem Director, 1784–1789. Mediolani. W. X. Jansen, Phil, et Med. Doct. De Pellagra, morbo in Mediolanensi Ducatu endemio. Lugduni Bat. 1787. Apud Frank, Delect. ix. —Memoria sopra la Pellagra del Territorio Padovano, di Francesco Fanzago. Padova, 1789.—Videmar de quâdam impetiginis specie, morbo apud nos in rusticis nunc frequentiori, vulgo Pellagra nuncupata, Disquisitio. Mediolani, 1790. 8vo.—Discorso Comparativo sopra la Pellagra, l'Elephantiasi de Greci, o Lepra degli Arabi, e lo Scorbuto, ed alcuni reflessioni intorno la cura, del D. Paolo Dalla Bona, Veronese. Venezia, 1791. 8vo.—Osservazione Medico-pratiche, che formano la storia esatta di una particular malattia chiamata Pellagra del D. Luigi Soler in Venezia, 1791, 8vo.—D. Sartago, Sulla Memoria sopra la Pellagra del Sign. D. Fanzago, Aneddoti Patri, No. 22. Venet. 1792. 8vo. p. 341–347.—Paralleli fra la Pellagra ed alcune malattie che piu lo rassomigliano del D. Franc. Fanzago. Padova, 1792. 8vo. Salom. Constant. Titii Prof. Med. Viteberg Oratio de Pellagrae morbi inter Insubriae Austriacae Agricolas grassantis Pathologia. Viteberg, 1792.—Tentamen de morbo Pella-

gra Vindobonae observato. Auctore Ludovico Careno Vindobonae, 1793.—Dissertazioni di Gaetano Strambio Sulla Pellagra, i. ii. In Milano, 1794. 8vo. pp. 189.—Ragionamento sopra la Pellagra. Dell Dott. Carlo Allioni. Torino, 1795.—Delle Malattie piu comuni del Dipartimento del Serio. Memoria di Giacomo Facheris. In Bergamo, 1804.—Trattato della Pellagra, Malattia che Desola le Popolazioni di Campagna del Regno d'Italia. Del Dottor Giuseppe Cerri Medico-Militare. Volume Imo. Milano, 1807.—(In this volume, which is all that I have seen of the proposed work, Sign. Cerri gives an abstract of the labours of all the previous writers on Pellagra, and thus furnishes a complete view of the literary history of the disease. It is in some respects extremely valuable.)—Della Pellagra, e della Maniera d'estirparla in Italia, Memoria de G. B. Marzari Medico e Professore di Fisica, &c. Venezia, 1815, 8vo.—On the Pellagra, a Disease prevailing in Lombardy, by Henry Holland, M. D., F. R. S. E. Read June 24, 1817. Medico-Chirurgical Transactions, Vol. viii. p. 317. Lond. 1817.—Fanzago Sulla Pellagra Memoria, 2 Vols. in 8vo. Padova, 1815.—Cagioni, Natura, et Sede della Pellagra, Desunti dai Libri di Gaetano Strambio, Dissertazione di Giovanni Strambio. Milano, 1824. 8vo. Annales Scholae Clinicae Ticinensis. Auctore Francisco Nob. ab Hildenbrand, M. D., &c. Papiæ, 1826. Pars i. p. 100. Pars altera, 1830, p. 134.—Sulla Pellagra Osservazioni di And. Aug. Spessa. Annali Universali, 1832, Vol. lxiv. p. 207.—Alcuni considerazioni patologico-pratiche sulla sede, sulla natura, e sul trattamento curativo della Pellagra di Alessandro Bargnani medico primario nello Spedale delle Donne in Brescia Annale Universali di Medicina, Vol. lxxvii. Feb. e Marzo. 1836. Clinico Ragguglio dei Malati curati nel Manicomio di Cremona durante l'anno 1835, del Dottore Luigi Rossi, Medico assistente (Nel Medesimo.)

I. SEMIOGRAPHY.—The *Pellagra*, or Rough Skin, is a cutaneous disorder, prevailing principally among the peasantry in Lombardy, beginning in the exposed parts of the surface with rough wheals, pimples, and tubercles, and terminating in desquamation, chops, and fissures, and more or less change in the structure of the skin.

Its appearance is generally preceded by languor, despondency, fatigue on slight exertion, and a sense of weight in the limbs and feet, with stupor and giddiness, such that the individuals are unable to stand or walk erect, and sometimes fall down. After these symptoms have continued for some weeks, or even a shorter time, if the vernal equinox be approaching and the solar heat be intense, the patient feels generally, first, in the dorsal surface of the hands and feet, an uneasy sense of drawing, tension, heat and itching, and the epidermis appears red, shining, rough, and slightly swelled in particoloured patches or wheals, which gradually enlarge, by spreading from their original situation. The colour is of a more obscure and dusky red than that of rose, and the surface is covered with a moist fluid oozing from it, and in no long time the patches or wheals become still more rough and irregular by the formation of

small pimples and tubercles, while the *epidermis* is thrown off in thick opaque scales. It is to be observed, however, that Strambio denies that the eruption is attended with itchiness.

While the eruption is thus appearing, the symptoms of general languor and uneasiness are rather increased than diminished. The patients complain of headach, giddiness, and impaired vision, and wandering irregular pains in the trunk and limbs, but especially following the course of the spine and dorsal muscles. The spirits are depressed, and the mind despondent; the gait is feeble and unsteady; and the patients, unable to endure the heat, instinctively seek the shade. The appetite is variable and irregular, being sometimes languid, but more frequently voracious and actually bulimious. At the same time, the patients present various symptoms of indigestion, as flatulence, frequent eructations, cardialgic pains, alternating or accompanied with a peculiar sense of sinking and weakness in the epigastric region. Strambio, Senior, on the other hand, maintains, that though the *bulimia* is the most frequent symptom, it is remarkable in this, that it induces neither cardialgia or faintness, nor vomiting. The bowels are occasionally obstinately bound, and resist powerful doses of cathartics. More frequently, however, they are relaxed in profuse diarrhœa, with very unhealthy discharges, being watery and yellow, or greenish, sometimes ash-coloured or clay-coloured, and in some cases blackish.

It is also remarkable that these symptoms are unattended by quickness of pulse; and, indeed, the pulse is generally at the onset of the disease, and for some time afterwards, remarkably slow, so that Strambio states, that at this period he often found it to beat not more than thirty in the minute; and it is at the same time small and feeble.

After some days the swelling subsides, the surface dries, the *epidermis* is thrown off in scales, and the skin appears sprinkled with a foul scurfy dust, and in other parts it cracks, exposing the *cutis vera*, soft, of a dull red colour, and fissured. During the course of the summer and autumn, new cuticle is formed, sometimes healthy, more frequently diseased; and the parts remain red, rough, and shining, but appear in the course of the winter so sound in other respects, that, but from the well known course of the disease, it might be imagined that the evil was over, and not likely to recur.

But while the cutaneous disorder thus undergoes a tempo-

rary improvement, the symptoms of disturbance of the functions of nutrition are little altered. The appetite continues preternaturally voracious; the digestion is imperfect and accompanied with flatulence; and the bowels are either obstinately bound or immoderately loose, while the muscular strength is much enfeebled.

In the course of the ensuing spring, when the solar heat becomes considerable, the exposed parts of the skin begin to be affected in the same manner as the previous season, but more generally and extensively, and with greater intensity. Thus if the eruption have appeared the first season on the hands or feet, in the second it not only affects these parts, but the breast and neck, and the former more severely, deeply, and extensively. The skin becomes more rough, wrinkled, scaly, and chopped, and acquires a degree of hardness and inflexibility like leather or parchment, while it is tense, shining, and parched.

While the cutaneous affection is thus becoming more aggravated and extensive, the symptoms of disorder of the alimentary canal return in greater severity, and assume a more formidable aspect. The diarrhœa is more lasting and obstinate, and undergoes fewer intermissions. The fits of *bulimia* are frequent and violent, while the food which the patient devours with voracity, begins occasionally to pass from him almost unchanged, constituting lientery; and at the same time corresponding emaciation is observed.

With these symptoms are associated others indicating unequivocal disorder of the nervous system. The patient is affected with frequent spasms and pains in the muscular parts; with *vertigo*, *headach*, loss of memory, and occasionally slight delirium. The spasms and pains are often extremely intense, the latter often imitating those of nerve-ach (*neuralgia*,) and following, in the trunk, the course of the spine, and in the extremities, that of the large nerves; and in many, tetanic contractions of the limbs, especially of the fingers, (*Ankyle*,) take place. At the same time or soon after the memory is impaired, the mind becomes gloomy and despondent, the patient shuns society, and in his melancholy seeks solitude, and falls into a state of listlessness and mental apathy, in which all the natural appetites and desires seem to be extinguished, and a state approaching to catalepsy or ecstasy takes place, (*dementia*; *Anoia αβουλη* of Heinroth,) in which the mind seems entirely gone, and the patient is fatuous and senseless. In other instances furious delirium

ensues, and patients are so outrageous and unmanageable as to require being put under restraint. In this case the pulse is generally quick and hard. (Strambio.)

In either of these states it is observed that the perspiration exhales a most fetid odour, which is compared by Strambio and Jansen to the smell of mouldy bread. The other secretions are said not to be affected. Of the state of the urine no mention is made, except by Strambio, who represents it to be thin and pale. The discharge from the intestines is generally lenteric. The menstrual secretion may not be affected.

On the presence or absence of symptoms of fever, properly so called, authorities are rather discordant. I have mentioned that at first, and through the greater part of the course of the disease, the pulse is not only small and feeble, but very slow. In some instances it is stated that, in the course of the disease, the pulse becomes quick and hard, and the skin is hot; and in others it is said symptoms of hectic fever are observed. In these cases I believe the explanation of the symptoms now mentioned is to be found in the occurrence of inflammation of the lungs or bronchial membrane, or in the presence of tubercles and *vomicæ*. On this point the dissections of Strambio are important.

As the disease advances, the affection of the mind becomes more intense. The melancholy becomes more profound, and assumes, especially in females, the character of *lypemia* and suicidal *monomania*, in which state, according to Moscati many terminate their lives by drowning, (*hydromania* of Strambio.) This result, however, Hildenbrand states that he could not confirm by his own experience, though during the space of eight years he had observed some hundreds of cases of pellagrous invalids.*

In other instances in which life is not thus abruptly and violently terminated, the natural course of the disease is as follows. As the diarrhœa becomes lenteric and colliquative, and admits of being restrained by no remedies, the person is wasted rapidly and to an extreme degree. The appetite fails sometimes suddenly to so great an extent, that a patient, formerly voracious, does not taste food for several days. In some cases the patient becomes phthisical or tabid; in others he is attacked with *ascites* or general dropsy. Delirium, if not already present, comes

* *Annales Scholæ Clinicæ Medicæ Ticinensis. Pars I. p. 103.*

on ; and, if already present, alternates with, or gives place to, sopor and *coma*. In some cases convulsions often very violent ensue. In others tetanic spasms, either opisthotonos or emprosthotonos take place, especially when the patient attempts to rise in bed. In one or other of these fits, death may take place, or the patient may expire almost in syncope or coma, or a combination of both.

Some authors, as Frapolli and Jansen, have distinguished Pellagra into three stages ; the incipient (*Pellagra initiata*,) the confirmed (*Pellagra confirmata*,) and the desperate (*Pellagra desperata*,) These different stages we shall understand more clearly when the pathology of the disease is explained. It is enough to say, that the incipient stage of the disease is distinguished chiefly by the cutaneous disorder ; the confirmed stage by the symptoms of melancholy, mental distress, diarrhœa, and loss of strength ; and the desperate stage, by soporose, convulsive, or tetanic affections, obstinate colliquative diarrhœa, rapid wasting (*tabes*,) and fainting (*deliquium animi*.)

The duration of Pellagra is various in different individuals. In the most rapid cases it rarely proves fatal before the third summer. In other cases, however, the disease undergoes various undulations in its symptoms, and may be protracted for five, ten, or even fifteen years. Thus the first or incipient stage of the disease may continue in some patients for six, eight, or even fifteen years, during which the eruption disappears in the winter, and returns with the solar heat of spring.

The extent to which Pellagra prevails among the Lombard peasantry is very great. In 1784, when Strambio published his first essays on the disease, he calculated that the pellagrous invalids formed about one-twentieth part of the population in the districts in which the disorder was prevalent. In 1816, the period to which the account of Dr Holland refers, he inferred, that in the Milanese territory there were districts in which the proportion of pellagrous invalids was one in about five or six of the entire population ; and the years 1816 and 1817 appear to have been periods of great suffering among the Lombard peasantry from this disease, as well as from petechial typhus, in consequence of the failure of crops, and the general agricultural distress ensuing on violent political changes. Since that period, however, according to Hildenbrand, the disease has been less generally prevalent ; and in his report for 1818,

he states, that it had remarkably abated. In March 1820, however, it was again betraying its usual characters among the peasants, who entered the hospitals in much greater numbers than in the previous years. In April 1821, also, many cases presented themselves.

II. MORBID ANATOMY.—This subject has been investigated by Strambio Senior, Fanzago, Bargnani, and Zaccarelli and Rossi; and the following may be given as the general results of all.

1. There are uniform traces, and various consequences of previous inflammation in the whole or in parts of the gastro-enteric mucous membrane; for instance, injection in patches, ulcerations, thickened portions, effusion of a dense puriform matter, perforation of the mucous membrane, and occasionally of all the intestinal tunics. The alimentary canal was often of a blackish colour in spots and patches, in the dissections of Rossi. In other instances, however, they were of a cream-white colour.

2. There are less constantly traces and various effects of the inflammatory process in the brain and its membranes. The membranes may be more or less injected, may be turgid, or thickened, or ulcerated, with exudation of plastic lymph, or effusion of serum between the *dura mater* and skull, between the *dura mater* and arachnoid membrane, and between the latter and the *pia mater*; and the lateral ventricles are generally dilated with serous fluid effused most copiously. The substance of the brain and *cerebellum* is often indurated throughout, or there are found nodules or masses almost as hard as *scirrhus* disseminated in various directions through them. In other instances, there are abscesses, ulcerated patches, or softened portions, more or less extensive, with diminution or increase of the whole mass of the *encephalon*. Sometimes, however, these changes are not observed.

3. Almost the same kind and degree of changes did Bargnani find in the envelopes and substance of the spinal marrow; but they were less uniformly found than the morbid changes recognized in the brain. He states, however, that he found in several parts of the course of the spinal chord, more frequently than in the brain, the softening or pulpy destruction of the chord, and that he observed, also, between the membranes and the chord, the effusion of a yellowish dense puriform matter,

recognized by Ollivier as the indication of previous suppuration of the chord and its investments. Rossi in like manner found softening of the spinal chord, and inflammatory injection and thickening of its investing membranes, with effusion of serum between them and the chord.

4. Less uniformly, but still sufficiently often, Bargnani found traces of inflammatory action in other organs, within the peritoneum for example, and particularly on the surface of the intestinal peritoneum, in the mesentery, with evident enlargement of the mesenteric glands, in the omentum, and in the spleen and liver, very often with ascites.

In like manner, also, in the cavity of the chest, though more rarely, he recognized the effects of inflammation of the lungs or of the pleura; of the pericardium; mostly of the heart; with hydrothorax or empyema in one or in both cavities of the *pleura*. Rossi also found frequent adhesions. Strambio often found the lungs tuberculated, and presenting *vomicæ*.

III. ETIOLOGY. GEOGRAPHICAL DISTRIBUTION.—Pellagra has been an endemial disease in the various provinces of Lombardy, at least since the year 1769 or 1770. Some obscure traces of its occurrence in the neighbourhood of Milan are noticed so early as 1578, under the provincial epithet of *Pellarella*. But there is no evidence of its general occurrence among the peasantry till the year 1770 or 1771, when it was observed in the Milanese territory by Frapolli, and afterwards in 1776 in the district of Belluno by Odoardi. In the former, the situations mostly infested with the disease are Brianza and the hills of Seprio; in the latter, the parish of Lavazza; and on the left side of the Piave, and, indeed, excepting the low district of Agordo, all the villages in the province, and in that of Feltri. It has, since the time now specified, appeared in the districts of Padua, Lodi, Como, Pavia, and Laumello. Careno, who thinks he has seen it out of Lombardy, records three cases which he saw at Vienna. There is no doubt that it is the same disease as the Mal de la Rosa of Asturia.

By different observers, its prevalence in these districts has been ascribed to different causes. Thus Frapolli and Albera impute its appearance principally to insolation or undue and frequent exposure to excessive solar heat; Fanzago and Marzari, to bad food, and especially the habitual use of Indian corn; Thouvenel, to a bad quality of the atmosphere; and Cerri to climatic peculiarities. Odoardi again represents the proximate

cause of the disease to consist in what he terms a scorbutic dyscrasy; Strambio, having found in his dissections more or less disease of some of the abdominal *viscera*, considers pellagra as proceeding from more or less obstruction in some of these organs; Videmar makes it consist in a peculiar affection of the nervous system, not dissimilar to hypochondriasis; and Joseph Frank is inclined to impute the disease to the leprous diathesis, which he believes to have been long the appanage of the Lombards.

In these discordant views, we observe the remote causes confounded with the proximate, or the pathological condition in which the disease consists. To frame just ideas on its origin and nature, it is requisite to distinguish these two classes of circumstances.

It appears, in the *first* place, that pellagra is scarcely known in towns; and Joseph Frank states that he knew only two instances of the disease in the inhabitants of cities,—one in a stranger, the other in a porter. On the other hand, it is very common in villages and country hamlets, in which there is an agricultural population living in indigence. Though Lombardy is a district hilly and much intersected with slowly moving rivers, and consequently is allowed to be productive of miasma, yet to this cause pellagra cannot with justice be ascribed, since the disease is more prevalent in elevated regions than in the lower and more humid districts, which, as in the case of Agordo, in the territory of Belluno, may be completely exempt. It has also been impossible to trace any constant relation between its prevalence and the dryness or dampness of the season.

In the *second* place, it is observed that, in the districts in which it is prevalent, while certain classes of individuals escape the disease, others are in a large proportion attacked by it. Thus farmers, living in easy circumstances, cowherds and shepherds, goat-milkers, infants, and aged persons, very generally remain exempt from the disorder. On the other hand, agricultural labourers, and particularly hay-cutters, cultivators of corn-fields, humid meadows, and rice-grounds, water-wardens, and those who keep and regulate the irrigating canals, are very frequently the prey of this malady.

Thirdly, though the influence of *insolation* has been over-rated by Frapolli and Albera, Hildenbrand infers that it concurs in a particular way in the production of the disease. The

invasion of the disease is uniformly confined to the months of March and April, in which the solar heat is most intense in the Cispadan territory, where the disease prevails. It attacks only those persons who, having been confined during the winter in small ill-ventilated cottages, and relaxed by sloth, indolence, and poor diet, are suddenly exposed to hard labour without doors, while it spares those whose occupations are carried on in the shade or within doors. And the eruption which at its first appearance bears a close resemblance to the *eczema solare*, always begins in those parts of the person which are directly exposed to the solar rays. It is to be further observed, that, in consequence of the extreme indigence and penury of the Lombard peasantry, and the consequent want of suitable clothing and frequent ablution, the skin falls into a morbid state, in which its natural action and secretion are perverted and suppressed, and it thence becomes less able to resist the noxious impressions of the intense heat to which it is suddenly exposed. It thus appears that insolation is rather an exciting than a predisponent cause.

In the *fourth* place, there is good reason to believe that the peculiar character of the Insubrian atmosphere may have considerable influence in the production of the disease. Without being positively miasmatic, it is moist, dense, and cloudy; and the districts of Milan, Lodi, Padua, Pavia and Laumella, in which the atmosphere is impregnated with humidity from frequent inundations, moist pastures, stagnant waters, and rice-fields, furnish the greatest number of pellagrous invalids. It is also stated by Hildenbrand, that the first appearance of the disease may be referred to that period at which the practice of irrigating agriculture became most general in Lombardy; and at the same rate has the severity and frequency of the disorder increased. There seems, in short, from observing the phenomena of many analogous situations, strong reason to presume, that the effect of residence in such situations is not only to enfeeble the energy of the skin, to pervert, repress, or derange its circulation and secretions, and thus to render its texture liable to various disorders, but to derange the circulation of the great internal skin and the organs therewith connected, and thus to lay the foundation of a complex cachectic disorder.

In the *fifth* place, the influence of food must be admitted to be powerful and important in the production of *pellagra*. It

is, however, impossible to ascribe with justice to the habitual use of the Indian corn (*Zea Mays*,) flour in pottage, or pudding, or bread, the prevalence of this disease among the peasantry of Lombardy; and sufficient proof of the contrary is found in the fact, that though this species of food be in general use not only in Lombardy, but in most of the agricultural districts of Italy, the disease does not affect the whole of the Lombard peasants. The same inference is still more decidedly corroborated by other facts. Though Indian corn flour has been employed as an article of food in various countries of Europe for more than three centuries, and has afforded daily subsistence to the inhabitants of Lombardy for an indefinite series of years, yet *Pellagra* has not been known beyond seventy-five or seventy-six years. But not only in the various regions of Italy, and in those beyond the Po and Placentia, but even in other countries, as the Tyrol, Hungary, Bukowine, and the West India Islands, does the Maize flour form the principal article of subsistence among the indigent, and especially the agricultural population, without the disease being even known by name among these inhabitants; and even among the poorer inhabitants of towns, the Maize pudding is almost habitually used, without producing similar results.

Lastly, the wood-cutters, known by the name of Mountaineers, who congregate from the hills beyond the Po, and the neighbourhood of Novara, into the Pavian and Milanese territory, live entirely on the Indian corn pudding (*polenta*) and yet, with the exception of a few individuals who inhabit this territory for some time, remain completely free from the disease.

It must not, however, be denied that the maize flour is much less nutritious than that of wheat, oats, or the other *Cereal*ia. Jasnüger maintained that it was altogether void of gluten; and Marabelli and Moretti showed experimentally, that though it contained a glutinous vegeto-animal matter, this was in small quantity, and of a different quality from that which is ordinarily and copiously contained in wheat and rice. The gluten of maize flour is, in short, filamentous in texture, inelastic, and of a yellowish colour, from the admixture of resinous matter; and hence the bread baked from it is dry, friable, heavy, very acescent and difficult of digestion, swells in the mouth, and is swallowed with difficulty, unless the mass be diluted with water. The pudding (*polenta*) prepared by boiling the flour in water with salt, to the consistence of firm pottage, though more

digestible than the bread, requires, however, for its assimilation, the energy of a vigorous stomach. Upon the whole, it may be inferred, that the constant use of this article does impair the powers of the stomach and intestinal tube, and when aided by the concurrence of other causes may irritate and eventually disorder the gastro-enteric mucous membrane.

The influence of this unvaried species of food in a country such as Lombardy, and amidst such wretchedness, will appear so much the more clearly and forcibly, when we remember the results of the experiments performed on himself by Dr William Stark in the end of 1769 and beginning of 1770; those performed at a much later period by Magendie on the lower animals; and the effects of the dietary of the Milbank Penitentiary observed in 1822, upon the inhabitants of that establishment. These experiments and observations show that it is not so much the innutritive quality of the articles employed for subsistence, as the constant and unchanging use of the same article. The effects of a monotonous and unvaried species of diet are not only not to nourish or afford nutritious chyle, but, it would appear, occasionally to irritate the mucous membrane of the alimentary canal, and thereby to lay the foundation of various diseases, either of that organ or of the parts connected with it, directly or sympathetically. If such a mode of diet do not of itself induce direct disease, it may induce a predisposition, which renders all the organs and textures morbidly susceptible, and liable to become diseased, on the application of suitable exciting and occasional causes.

But independent of this circumstance, of a monotonous and unvaried species of diet, it is further known that the food of the Lombard peasantry is both scanty and innutritious. The maize bread or pudding, without any addition or *opsonium*, is almost the only article on which life is sustained, and if at any time, any change or addition is observed, it consists of a little salt fish, or a few vegetables fried in rancid empyreumatic linseed oil, while their drink consists of water, often impure or muddy.

In short, pellagra and its prevalence among the Insubrian peasantry may be regarded in the light of an experiment on the great scale, illustrating the effects of improper and innutritious food, combined with other circumstances of indigence, penury, and misery in the articles of shelter from the inclemency of the weather, sufficient houses, clothing, and personal cleanliness.

Though it affects both sexes and all ages, yet there are certain periods of life at which it prevails more than at others. From the lists of the ages of the pellagrous patients, given by Strambio, as admitted into the hospital of Legnano, Allioni infers, that pellagra affects, principally and preferably, persons between the thirty-sixth and sixtieth year. It is to be observed, however, that many persons have the seeds of the disease sown in infancy ; and that the majority of deaths take place before the fortieth year of life.

IV. PATHOLOGY.—The morbid anatomy shows only the effects of this disease and the various changes which are effected in the different elementary systems of the human body. From this, however, combined with the symptoms and the usual progress of the disease, we may attempt to form some notion of its pathological nature.

Gaetano Strambio appears to have been the first who attempted to form any accurate notions on the origin and development of this malady ; but he confined his ideas chiefly to the state of the abdominal *viscera*, in obstruction of which he conceived the disease chiefly to exist. Fanzago again regarded pellagra as dependent on atony of the stomach and intestinal tube ; and he was not perhaps far wrong when he said, those the primary seat of this atony, and the pathological state forming the proximate cause of the disease, might probably be found in the abdominal mucous membranes, and especially in those of the stomach and intestinal tube. These ideas have been enforced and illustrated by Strambio Junior and Bargnani, both of whom follow many of the pathological principles of M. Broussais, and perhaps still more judiciously by Francis Hildenbrand.

It seems to be well established that the cutaneous eruption is neither the most essential part of the disease, nor that which constitutes the first characters of disordered health. From the manner in which the disease approaches, the symptoms of languor, oppression, headach, giddiness, and pain of the spinal column, with muscular feebleness which it presents, it seems to be a just conclusion, that, previous to the cutaneous eruption, the great and extensive surface of the gastro-enteric mucous membrane, or the internal skin, which had been long subjected to undue and unhealthy excitement by the use of improper and indigestible food, is at length thrown into a state of chronic or

subacute irritation. This state is indicated by the variable appetite, the frequent *bulimia*, the diarrhœa alternating with constipation, and the state of the intestinal discharges.

This membrane, however, having intimate physiological relations with the external skin, and with the spinal chord by means of the numerous branches, twigs, and filaments of the splanchnic nerves, continues no long time in this morbid state without transmitting the unhealthy and excessive impressions to both organs, inducing in both a morbid irritability, and such derangement in the circulation and secretions, that the former is unable to resist, as in a healthy person, the intense impressions of the solar heat, and the latter, with its membranes, is thrown into a state of vascular irritation and congestion, which at length may terminate in true inflammation and its legitimate products. But the disorder of the nervous system affects not only the spinal marrow and its investments, but the brain and its investments.

In this case it may become a just subject of inquiry, whether the textures of the nervous system or those of the alimentary canal are first diseased. On this point it may be observed, that the *bulimia* and constipation, or diarrhœa, are indications not only of gastro-enteric catarrh, as Hildenbrand thinks, but of hebetude, and deficient regulating power in the brain over the chylopoietic *viscera*. It may also be said that even the cutaneous eruption is an indication of some similar incapacity in the cutaneous texture, to resist the unfavourable impressions of intense solar heat, as we know, that in the healthy state of the system, the principal effect of insolation is merely to induce profuse secretion, some degree of tanning, and perhaps an eruption of freckles (*ephelides*,) or at most the prickly heat or the *eczema solare*. In this case, on the other hand, instead of producing these temporary changes, it induces an affection of the skin not only very severe, but recurring periodically, and becoming every season more violent, so long as life is continued.

It must be further observed in favour of the prior or at least the coetaneous affection of the nervous system, that the giddiness, pain of the head, stupor, pain of the spinal column, loss of muscular power, and inability to walk erect, are among the earliest symptoms of the disease. They seem to constitute a

stage of irritation of the nervous system preceding that of hebetude and *inertia* which is to ensue.

The arguments which may be adduced on the other hand in favour of the view, that the nervous system, that is, the brain and spinal chord and envelopes, are affected subsequent to the alimentary canal, are the following.

Though symptoms of affection of the brain and spinal chord may appear with the first occurrence of the eruption, these symptoms are slight, equivocal, and transitory. Serious unequivocal, and permanent symptoms of disorder of this system, on the other hand, appear generally in the second or third year, and at all events ensue chiefly after the cutaneous eruption has recurred several seasons, and some time after the establishment of the symptoms of gastro-enteric irritation. Thus, amaurotic giddiness (*scotodinia*,) the sense of a dazzling light before the eyes (*marmarage*,) torpor, formication, or pricking in the skin, (*myrmekismus*,) insensibility and hypochondriasis, appear chiefly in the second season, after the affection of the alimentary canal has continued for some time; and about the same period, generally, are observed pains in the spine, loins, and limbs, and tetanic contractions of the arms and legs or fingers, and other indications of irritation of the spinal chord. At a later period ensue the loss of memory and will, the mental hebetude and apathy, and the torpor of the whole system, or, in other cases, the profound grief and the tendency to suicide, or the furious mania and convulsions.

In these circumstances it may be argued, that the irritation and disorder of circulation in the brain and spinal chord here indicated, must have succeeded to the irritation of the chylopoietic *viscera*, and might be the result of irritation previously excited in them, and thence propagated by the medium of the splanchnic nerves from their distributed or organic ends to their central or cerebral connection.

Under all circumstances, however, we see in the phenomena of this disease a strong and pointed illustration of the bifarious influence of the gastro-enteric mucous membrane on the nervous system, and on the skin; and we remark, also, as has been already observed, the effects of imperfect nutrition.

V. PROGNOSIS.—This is always unfavourable, and becomes infinitely more so after the incipient stage of the disease is over. Titius mentions the case of a pellagrous person, who, by quit-

ting his country, avoid for twenty years the periodical accession of pellagra, to which he was subject.* It is only in the incipient stage of the disease, Hildenbrand allows, that a cure can be obtained, and this seems, from his account, more like a temporary alleviation than a permanent recovery.† Bargnani, however, admits that instances of spontaneous recovery from pellagra have taken place, even with promptitude, by the patients changing their mode of diet, and substituting for acrid irritating food and drink, bland digestible aliment.‡

In the confirmed stage, after dynamic changes are established in the chylopoietic viscera and the cerebro-spinal system, and proceeding to the formation of organic changes, recovery is out of the question. The natural course of the disease is, as in all similar cases, to the termination of life; and the patients pine out a miserable existence in a state of indescribable physical and mental imbecility. Joseph Frank states, that it annually destroys several thousand persons.

VI. TREATMENT.—It is easy, from the foregoing observations, to perceive that medical treatment in pellagra is restricted within very narrow limits. It is, indeed, in the incipient stage only, or at the first commencement of the malady, that there is any room for medical management; and at this period it should be directed chiefly, so as to prevent, if possible, the further progress of the diseased process in deranging the action of the alimentary canal.

For this purpose, gentle laxatives and eccoprotics, antacids, alteratives, and tonics are principally indicated. Above all, it is important to improve the diet, not by rendering it immediately highly nutritious, but by making it consist of light digestible food, of the mildest and least irritating character. A moderate allowance of fresh animal food seems calculated to be highly useful; and if wine or malt liquor in stated quantity were given, it might, by the gentle stimulus afforded, direct the current of circulation in the proper channels.

Next to the due regulation of the alimentary function, it is of the utmost importance to restore the healthy action of the skin. For this purpose, no remedy is better calculated than the frequent use of the warm bath, and regular washing the surface of

* *Oratio de Pellagra apud Frank Delectum*, Vol. xii. p. 163.

† *Annales Scholæ Clinicæ Med. Ticinensis*, Pars altera, p. 135.

‡ *Alcune Considerazioni, &c. in Annali Universali di Medicina*, Vol. lxxvii. p. 242.

the skin with warm water and soap. Frequent changes of linen, also, are indispensable, and the use of flannel would undoubtedly contribute to the same object. Besides the measures now specified, the Italian physicians have recommended the use of whey, with the herbs denominated antiscorbutic, especially purslain, (*Portulaca oleracea*,) and the employment of tonics, as bark, simarouba, columbo, and gentian. Decoction of Iceland moss is in general use in the hospital of Milan. These remedies may act on several of the symptoms of the disease; but it is not rational to expect them to remove the general disorder and organic lesions which almost invariably have taken place after the lapse of one or two seasons. Dover's powder or lime-water is indicated by the presence of diarrhœa.

Upon the whole, the most rational remedial treatment consists in the administration of good nutritious diet, attention to the state of the bowels, to that of the skin by means of the warm bath and sufficient clothing, and, above all, removal from the locality in which the disease is observed to prevail.

The prophylactic treatment, which is most important, should be commenced in infancy, or at least at an early period of life. It ought to have in view the physical and physiological regulation of diet, clothing, and shelter from the influence of morbid agents. The only effectual mode of preventing the developement, and arresting the progress, of this disease in Lombardy, is to improve the condition of the peasants, and to augment the number of their comforts, in the articles of residence, clothing, and food.

§. XIV. Mal Rouge de Cayenne. The Cayenne Leprosy or Eruption. *Morbus Ruber Cayennæ*.

Bajon, *Memoires pour servir a l'histoire de Cayenne et de la Guyane Francaise*. Paris 1777, 1778. 8vo. 2 vol.—Forster, *Observations made during a voyage round the World*. London 1782, p. 485.—Rapport des Commissaires de la Société Royale de Medecine sur le Mal Rouge de Cayenne ou Elephantiasis, 8vo. Paris, 1786—Bergeron *Dissertation sur le Mal Rouge observé a Cayenne*. Paris, 1823.

The Red Eruption of Cayenne, a disease which has been described by Bajon and Forster, is a cutaneous disorder said to be endemial in that island.

It comes on with an eruption of spots, which are at first red, and afterwards assume a yellowish tint, without much sensation, affecting the face, ears, neck, and at length the skin of the whole person. These spots come out rapidly, and give rise to

desquamation of the cuticle, and the formation of a branny pulverulent dust. On the face the skin becomes thick and immoveable; and at the ears and lips tubercular elevations are formed. The incipient macular eruption now mentioned is succeeded by the formation of pustules on various parts of the body, which pass into foul, fetid, dull red fungating ulcers, which not unfrequently penetrate so deep as to induce caries or softening in the bones.

The urine is muddy and oleaginous.

In Europeans resident in the Island of Cayenne, it is said to be in general less violent, and less frequently to produce ulceration, and affect the bones than in natives.

Little satisfactory information is possessed on the nature or causes of this eruption. But it seems to belong to the same family with the Radesyge.

From the Report of the Commissaries appointed by the Royal Society of Medicine in Paris, it appears that they regard the disease as the same with or analogous to tubercular leprosy,—an opinion in which they have been followed by Bergeron.

§. XV. Die Krimmische Krankheit. The Crim Evil.

KRIMSKAIA BOLESNA, Astrachan; TCHERNAIA NEMOTSCH, the black epidemic of the Kossacs. *Lepra Taurica. Morbus Crimensis.*

Gmelin, Reise durch Russland und Sibirie von dem Jahr 1733 bis 1743. Goettingen, 1751, 1752—4 Band, 8vo. Band 2d, 169.—Pallas Reise durch Verschiedenen Provinzen des Russischen Reiches von dem Jahr 1768 bis 1774, 2 Theil S. 302. St Petersburg, 1781, or Voyages de M. Pallas. Paris, 1788, T. 1, p. 477, 652, and 659—Falk Beytrage zur Topographischen Kenntniss des Russischen Reiches. St Petersburg, 1785—1 Th. Seite 176—Henrici Martii, de Lepra Taurica Specimen Medico-practicum, 8vo. Lipsiæ, 1806.

The Crim Tartary Disease or Taurican Leprosy is a cutaneous affection endemial in the Crimea, in Astrachan, and at Jaitzkoi-Gorodok, near the river Jaik, and more recently, according to Schnurrer, on the table-land of the Ural mountains.

The disease begins with febrile symptoms, as great feebleness, pain and weight in the limbs, and frequent shivering succeeded by heat. But the first characteristic symptom of the disease is a bluish livid or violet-coloured swelling of the face, which is speedily followed by the appearance of red spots or patches on various parts of the body, and especially on the extremities,—at first void of pain, but after some time giving rise to an uneasy sense of scalding and itching.

In the course of a space of time varying from some months to about two years, the skin becomes rough, hard, and scaly, and assumes a brown-red colour, excepting only the palms of the hands, the inner surface of the arms, the arm-pits, the *nates*, and the hams; the face becomes of a particularly red-brown colour, and swells into a shapeless mass; the glands of the neck and head become hard, and at length suppurate; and the rough hard patches of skin at length passing into the suppurative process form bad ulcers, showing no disposition to granulate, but secreting a foul glutinous matter, which is concreted into hard brown crusts. These ulcers are not uncommon on the feet, where they exhale a fetid odour, penetrate to the bones, and not unfrequently cause the separation of several if not the whole of the toes. Similar destruction may take place in the fingers. At a more advanced stage, and perhaps in a severer form of the disease, the throat is swelled, and its passage contracted; the gums and tongue become soft, painful and eroded; and ulcers are formed in the mucous membrane of the nostrils, mouth, throat, windpipe, and œsophagus. Though the process now mentioned with the obstructed state of the nostrils renders the breathing difficult, yet the patients enjoy good appetite, and generally sleep well, excepting when, in consequence of changes in the weather, the pains in the limbs become very troublesome. The sexual appetite is not observed to be increased; and all desire, indeed, is said to be extinguished.

On the causes of this disease little is accurately known. Some contradiction even seems to exist as to the locality in which it mostly prevails. Thus Guckenberger denies entirely the existence of this cutaneous disease in the Crimea, and maintains that it prevails principally in the Astrachan government; while Gmelin, on the other hand, represents it to be quite common in the Crimea. Its subsequent appearance in Jaitzkoi has been ascribed by the Kossacks of that district to importation from Astrachan in a Persian expedition. But even upon this point of communication by human intercourse there is some difference of opinion. Though Gmelin and Finke represent the disease to be luckily not contagious, they allow that, when once in a family, it is very readily propagated. Schnurrer conceives that its propagation among a community is in favour of the idea of contagion; and he states, that, though the inhabitants of the Crimea do not shun intercourse with infected persons, and even

use the same vapour baths, yet they refrain from eating or drinking from the same vessels, and that the disease readily affects the different members of the same family.

According to Gmelin those are most liable to the disease who are restricted to a scanty allowance of fish and salt provisions, who spend inactive lives, and who have previously laboured under itch, scurvy, or intermittent fevers imperfectly cured. According to Pallas, on the other hand, the disease affects chiefly robust middle-aged persons, and he represents the blood of such persons to be thick and of a deep-red colour.

As to its tendency the disease is stated after some years to terminate life by affecting the internal organs.

On treatment little is satisfactorily ascertained. The disease is aggravated by the use of mercury. At the commencement antimonials and restricted diet are most beneficial. But the natives of the Crimea seem to repose the greatest confidence in the use of a decoction of the leafless sea-side grape, (*Anabasis aphylla*), and baths of mare's milk. The decoction of the Borith, or sea-side grape (*Anabasis*), has been tried by the inhabitants of the borders of the Jaik, where the plant also grows, but without success. From its topographical localities, and its botanical relations with the *Salicornia*, I think it not unlikely that it contains chloride of sodium, soda, and iodine.

§. XVI. Scherlievo and Fiume.

These names have been applied to a form of cutaneous or rather cutaneo-mucous disorder prevalent chiefly in the towns and districts so denominated in Venetian Lombardy. From the accounts given, the eruptions bear a close resemblance to those of secondary syphilis. As my limits do not allow me to enter into the detailed history of these eruptions, I refer for an account of them to a good paper by Giovanni Battista Gambieri, in the *Annali Universali di Medicina*, Vol. xii. No. 34 and 35. 1819.

Falcadina.—This is a similar cutaneo-mucous disorder, to which the same remark is applicable, as was now made regarding the eruptions of Scherlievo and Fiume. The eruption is so named from its appearance in 1790 in the village Falcade in the district of Agordo in the province of Belluno, contiguous to the Tyrol. Its occurrence was ascribed to importation by a female mendicant labouring under venereal itch and ulcers of the pudendal mucous membrane. By Zecchinelli,* Val-

* Lettera del dott. Zecchinelli di Padova al dott. Thiene di Vicenza sulla Fal-

lenzasca, * and Marcolini, † by whom it is described, it is regarded as a variety of the Scherlievo.

After general uneasiness, weariness, sickness, and osteocopal pains, symptoms of fever ensue, and are followed by pustular swelling of the lips and mouth, which proceed to ulceration, affecting the *velum*, *uvula*, tonsils, and nasal mucous membrane.

A pustular eruption of a livid red colour afterwards appears on the skin, intermixed with scaly and vesicular roughness as in pellagrous patients.

In the advanced stage, the leading symptoms are emaciation with hectic fever, atrophy of the limbs, especially the superior extremities, and contractions more or less spasmodic.

As the most judicious authorities concur in regarding the three forms of cutaneo-mucous disease now mentioned as merely varieties of the secondary or constitutional effects of *Lues venerea*, it is superfluous to give particular directions for their treatment. This, indeed, will be under all circumstances most successfully and safely conducted by adhering to the general principles of improving the action of the skin and the mucous surfaces, and adopting either the antiphlogistic regimen and the diaphoretic woods, or the use of tonics and light nutritious diet, according to the symptoms and the effects of the regimen.

There are still some other cutaneous disorders, which should perhaps have been mentioned and described in this place. I allude chiefly to *Molluscum* or the soft tubercle, *Elephantiasis* or tubercular leprosy, and the peculiar cutaneous affection called the Keloid tumour. Of the first I have spoken in my Elements of Pathological Anatomy, and have little further to add on its nature or treatment. Of the second, whatever we have learnt pathologically, we have no new therapeutic information. The disease is indeed beyond the present powers of the healing art. The third affection is more of a local than general character, and, as such, becomes a subject rather of surgical than of medical treatment.

cadina, o sia sopra una particolare infezione venerea, che regna da qualche anno nel Villaggio detto Falcade nella Provincia di Belluno. Annali Universali, Vol. xiii. Milano 1824.

* Storia della Malattia Falcadina affine allo Scherlievo manifestatasi nel distretto di Agordo, nonche in varie parti della Provincia Bellunese; di Giuseppe Vallenzasca. Annali Universali, Vol. xxxi. p. 203, Milano 1824.

† Marcolini, Memorie Medico-Chirurgiche, 8vo. Milano 1829, p. 18.

CHAPTER II.

INFLAMMATION OF THE MUCOUS MEMBRANES.

Phlegmhymenitis. Hildenbrand.

Conradi Schneider, de Catarrhis, Lib. vi. Witteb. 1670.—Franc. ab Hildenbrand, Dissert. de Catarrhis iisque subdolis et perniciosis. Viennae, 1812.—Cabanis, Observations sur les Affections Catarrhales en general, 2d edit. Paris, 1813.

THOUGH I have considered the morbid anatomy and the pathological relations of the Mucous Membranes in my Elements of Pathological Anatomy at sufficient length to supersede the necessity of similar details in the present work, I feel it requisite to enumerate shortly certain circumstances common to the inflammatory process in all the mucous membranes, and to direct the attention of the student to those general characters and effects by which that process is attended, in whatever mucous membrane it may take place. I understand at the same time, that the remarks now to be offered are peculiar to inflammation occurring in the mucous membranes; and that while we suppose the phenomena common to inflammation, wherever it exists, may occur also in these membranes, our present attention is to be directed principally to those phenomena which are proper to inflammation in the mucous tissues.

When a mucous membrane is attacked by inflammation, besides the usual phenomena of redness, heat, pain, and swelling, it presents other phenomena in the change or perversion of its action. It is at first unusually dry, and then begins to secrete a thin serous fluid, which principally, from the rawness of the surface, seems to possess acrimonious or irritating properties. The surface of the membrane is raw, sore, and extremely tender; and the application of foreign bodies produces much uneasiness and distress. After the lapse of a few hours or a day, sometimes a longer space, the preternatural dryness abates, the thin serous fluid, becomes thick and more or less copious, and though the rawness, tenderness, and soreness are little abated, or may continue unchanged or even increasing, the redness is less deep, and the swelling less intense.

The state now described may appear in one of two modes. 1. Either it may ensue suddenly upon a state of the membrane previously to all appearance healthy, or 2. it may come on more slowly after the membrane has been raw, tender, and sore, and

the seat of some uneasy sensations on the admission of air, or the application of foreign bodies. In the first case, the inflammatory process is the immediate and direct consequence of the operation of the exciting causes on the membrane or membranes. In the second, it is preceded by a state of tenderness, soreness, and general suffering, which does not admit of the application of foreign bodies, or the performance of the usual motions which the membrane may undergo in the state of health without any uneasiness to the patient. The latter state is denominated Irritation, in contradiction to Inflammation, from which it is somewhat different. As this term is often used in a manner rather vague and indefinite, and as it is in the mucous membranes and organs provided with mucous surfaces that the pathologist has most frequent occasion to speak of Irritation and the Irritative condition, I think this is one of the most convenient places to explain shortly the characters of irritation as a morbid process.

Of the mucous membranes the anatomical arrangement is such that all of them are in contact, constant or occasional, with foreign bodies, either introduced from without, or the produce of actions and processes going on at their surfaces, or in organs connected with them. Thus, with the mucous membranes of the facial cavities, the windpipe and the bronchial membrane, the atmospheric air is in constant contact, and with that of the mouth and *oesophagus* articles of food and drink are in occasional contact. To the mucous membrane of the stomach and *duodenum* the alimentary mass, during its conversion into chyme, is applied; the ileal mucous membrane has likewise at all times foreign matters applied to its surface; and to the mucous membrane of the colon the residual portion of the aliment which is to be eliminated as excrementitious with its gaseous contents, is also in constant contact.

In like manner the urinary mucous membrane in both sexes is incessantly traversed by the urine; and the membrane lining the genital organs is also periodically or occasionally exposed to the transit or sojourn of foreign products. Over the mammary mucous membrane the milk passes during the period of lactation.

Of the whole of these membranes it is the common character, that, in the state of health, their respective substances are applied to them not only without producing uneasiness, but with a degree in general of agreeable, though often imperceptible, or

at least unperceived pleasure. Air passes over the mucous membrane of the nostrils, mouth, and windpipe, without inducing cough or any uneasiness in these parts, and food and drink are received, and excrementitious matters voided without uneasiness or pain in any part of the alimentary canal or urinary mucous membrane. Of these transitions and applications, indeed, it is the character of health to be quite unconscious; and though the observation, that, to be unconscious of the possession of lungs or a stomach be the proof of perfect health, be homely and perhaps vulgar, it is still founded on correct observation, and strictly accordant with physiological truth. This state I propose to distinguish, in imitation of Reil and Hubner, under the name of *Cœnaesthesia Mucosa*, or Common Sensation (*Gemeingefühl*) of the mucous membranes. *

Another condition, however, besides the healthy state of the membrane, is requisite to the enjoyment of this state of comfort or unconsciousness of the existence of these membranes. It is that the substances applied possess certain qualities which fit them to operate in a beneficial manner. Thus the atmospheric air must be pure and void of adventitious mixtures; it must neither be too hot nor too cold; neither too moist nor too dry; and it should not be loaded with vapours or gases issuing from animal or vegetable matters in a state of putrefactive decomposition, or impregnated with sulphurous acid gas, nitrous acid gas, chlorine, ammoniacal gas, sulphuretted hydrogen, or any similar irritating agent. The food and drink, in like manner, should be sound, fresh, and good in quality, and in quantity not excessive. As such substances or agents are known to be necessary to the well-being of the system, to the due performance of the functions carried on in the mucous membranes, and to the healthy state of the membranes themselves, they are denominated *Stimuli* or Natural *Stimuli*.

Any deviation from the normal state of the two characters now specified, viz. 1. the healthy state of the membrane, and 2. the due condition of the *stimuli*, as to quality and quantity, is immediately attended or soon followed by an assemblage and series of sensations, which vary according to the anatomical position and physiological properties and uses of the membrane,

* Cœnesthesis. Dissert. Inaug. quam Praeside, J. Ch. Reil, Med. et Chir. Doct. pro gradu Doctoris die 23tio Aprilis 1794, defendet Christ. Fred. Hubner. Meso-Marchicus. Halae, 1794.

but all of which agree in the circumstance of an exaltation or preternatural increase of *Coenaesthesia*. Thus, if to the mucous membrane of the eye a foreign body be applied, or air containing hartshorn, chlorine, or any stimulating vapour be admitted, it is followed by an increased flow of tears, and a sense of smarting and uneasiness in the eye. The presence of a mechanical or chemical agent on the Schneiderian membrane, or the sudden impression of cold air in a heated state of the body, is followed by sneezing. When the laryngeal, tracheal, or bronchial membrane is inflamed, or when the inspired air contains chlorine, nitrous gas, or sulphuretted hydrogen, coughing more or less violent is excited. When the mucous membrane of the stomach is inflamed, the lightest food and the mildest fluids are rejected by vomiting; and it is well known that, even when the textures of the stomach are in a healthy state, the introduction of various substances gives rise to this irritable state of the stomach. A cause not uncommon of vomiting not seated in the stomach is obstruction, temporary or permanent, of the intestinal tube. In each of these cases the mucous membrane of the stomach is first excited or irritated, and this irritation is thence communicated to the diaphragm and abdominal muscles.

To the mucous membrane of the intestinal tube many states, and the introduction of many different substances, may act as irritants. The state of inflammation itself is an irritating agent, which increases the afflux of fluids to the surface of the membrane, throws the muscular fibres into excessive, violent, and often irregular action, and compels the intestinal tube to make, as it were, frequent efforts to get rid of its contents, and of the cause of offence. This species of irritating agent is seated in the intestinal membrane itself. But the same effects may be produced by the introduction of various substances, while the membrane itself is in a healthy state. Thus various substances used as articles of food may either, in certain states of the system, or in certain conditions which they are liable to acquire, become irritants of the intestinal tissues. Corrupted grain used as food, certain animal substances, as pork, the flesh of young animals, as veal, the flesh of several of the red fish, as salmon, herrings, and mackerel, are liable to irritate the mucous membrane of the intestinal tube. In like manner various substances containing acids, as unripe fruit, currants, apples, &c. acescent malt liquor, as ale or beer, vinegar, sugar, honey, and in some instances wines, either natural or factitious, especially currant

wine, act not unfrequently as irritants more or less violent to the intestinal mucous membrane, though previously in a healthy state.

Lastly, the whole tribe of medicines employed as emetics and purgatives act as irritants of different degrees of power on the gastric and intestinal mucous membrane. The neutral salts, calomel, tartrate of antimony, aloes, jalap, scammony, colocynth, gamboge, elaterium, and hellebore, when introduced into the alimentary canal, all are first succeeded by different degrees of irritation in the mucous membrane of the stomach and intestinal tube, whatever be their ultimate effects. The signs and effects of this irritation continue until, by the action which they excite, these substances are eliminated.

These facts and considerations are requisite to show how irritation of the mucous tissues is produced, in what it consists, and wherein it differs from inflammation. It may be said to require the following circumstances. *First*, it requires the presence of some irritating agent, either developed within the system or introduced into it; and it may be observed that, though it be not always practicable to discover the presence and existence of this agent, yet there can be no doubt that it always does exist. *Secondly*, irritation may be said to consist in an unusual exaltation or excitement of the natural properties of the texture irritated, by means of which its sensibility is preternaturally and morbidly developed and augmented, and the muscular fibres of the connected tissues are thrown into undue, excessive, and sometimes irregular action.

Though various traces of the doctrine of irritation may be found in the writings of Whytt, J. Hunter, Brown, and Darwin, the first persons who appear to have admitted it as a principle in pathology, were Monteggia and Guani, the last of whom particularly was led by the phenomena of the epidemic fever of Liguria in 1800 to establish a variety of vital action different either from stimulation or contra-stimulation, in which the excitation was neither elevated nor depressed, but perverted and rendered irregular. To this he applied the distinctive epithet of Irritation, and the disposition or tendency to it he characterised as the Irritative Diathesis.

In attempting to fix the characters of irritation, however, as distinct from stimulation and contrastimulation, Guani fell into so many unfounded notions, that Rubini undertook to

examine the characters assigned to this state, and showed their insufficiency; while Buffalini, Penolazzi, and Geromini proved that, according to the hypothetical conditions established by Guani, irritation in no manner differed from the actions of *stimulus* and *contrastimulus*.

Bondioli, Fanzago, and Geromini, who have studied most minutely the subject of irritation, have attempted to frame and communicate ideas of its nature much in the manner above followed, by tracing its developement from those circumstances which uniformly precede its occurrence, or, in other words, from those agents or causes by which it is most obviously induced. From the observations and reasonings of Fanzago, it results that various irritating agents may produce, first, an action entirely local, and, consequently, give rise to local symptoms only; and if the irritating cause be removed, or if this be impracticable, if the powers of the texture irritated be adequate to eliminate it, or if appropriate soothing measures be employed, then the irritative action ceases. If, however, neither of these results ensue, the irritative action, which was at first local, begins by a progressive extension or radiation to diffuse itself, so as to disturb the vitality of the injured part, but still within certain limits, without becoming universal. In this respect he maintains that the action of irritants is different from that of stimulating and depressing agents, of which it is the character always to affect the system generally, while any deranged sensation or motion in parts remote from the seat of irritation is evidently of a more local and temporary character, and is dependent upon the consent or sympathy of parts.

This, it must be admitted, is not very clear or specific. Let us see what is said by Geromini.

According to Geromini, simple irritation is the primary or first morbid change in the organic motions which, agreeably to the laws of the animal economy, is developed immediately after the material condition of pain is induced, or after the application of an agent irritating either by the part in which it is seated, or by its quality or its quantity, whether external or internal, and which is further distinguished by its action ceasing more or less rapidly, with the morbid phenomena which sympathetically depend on its presence, when the irritating agent is eliminated, or when its irritating power is abated or neutralized.

To this view the chief objection is, that it is too limited in requiring pain to be present as an indication or evidence of the subsequent existence of irritation, and, perhaps, not perfectly correct in representing the irritative state to succeed the sense of pain. It may be observed, in the *first* place, that a texture may be irritated without giving any indication of that irritation by the existence of pain. If a foreign body, as a probang or a tube, be introduced into the larynx, it gives rise to extreme irritation of the mucous membrane and muscles of that part at first, but as soon as it is past the larynx, the irritation gradually abates, and at length ceases. Yet, in the whole course of this process, no pain, properly so called, is felt; and, when pain is felt, it is not at the part irritated, but often higher up. The mucous membrane of the duodenum may be irritated by undigestible food, or undigested articles which have been transmitted to it by the stomach; but no pain is felt in the *duodenum*; and the only indications are sometimes headach, languor, and a tendency to sleep. A stone in the bladder does not always irritate by exciting pain in the mucous membrane of that organ; but it excites pain in the urethra, and itching at the glans.

In short, I think it is reasonable to infer, that it is more like the character of irritation to induce at the part irritated an excessive sensation, such as I have already explained, whether that part be such as to transmit that sensation to the brain or not; and this violent impression is then followed by a perverted or disturbed state of the circulation of the part, which may or may not decline, upon the removal of the irritating cause, precisely according to the degree in which that cause has been applied. I think in general, also, that it is most consonant with the phenomena of the operation of irritating agents to say, that, when pain or even tenderness exists, it is an evidence, not that irritation is to come on, as Geromini imagines, but that it is actually present, nay, that the stage of irritation is sometimes past when that is felt.

It is important, in reference to this point, to observe, that, in the mucous membranes, pain is never felt in proportion to the degree of irritation or of inflammation. An agent, mechanical, chemical, or vital, may irritate any one of these membranes to a very considerable degree, without giving rise to pain or even tenderness in the whole course of the process, at least in the membranes so irritated. Thus we see daily in

the mucous membrane of the alimentary canal, irritations produced by articles of food and drink, and by morbid or unnatural secretions, without giving rise to pain in the course of the canal, but producing in various remote organs unusual sensations and phenomena.

A morbid irritation in the stomach, *duodenum*, and *ileum* may produce no sickness or pain in the region of these parts, but pains more or less violent in the extremities, similar to rheumatism or gout, or a combination of both. A profuse secretion of bile may produce, not pain in the seat of the liver or *duodenum*, but pains in the head and superior extremities, until it has been discharged from the system by bilious diarrhœa. In this case, however, the whole intestinal mucous membrane, from the orifice of the *ductus communis choledochus* to the *rectum*, is most intensely irritated; yet pain is not felt except at the *rectum* only, and here it ceases the moment the diarrhœa ceases.

The presence of worms, or of the secretions favourable to their production, in the intestinal canal, gives rise to a peculiar species of irritation, the marks of which are not by any means so distinctly seen in the intestinal tissues as in remote organs. It is true that the appetite is variable, and sometimes there is profuse diarrhœa alternating with constipation. But, besides these, there are foul breath, occasional cough, fits of difficult respiration, palpitation, headach, pains in various parts of the trunk, and a number of anomalous symptoms of disorder in the external sensations and motions. In short, the symptoms usually ascribed to the presence of worms in the intestinal tube are seated more in external than in internal organs.

It is also not uncommon to see inflammation in a slight degree developed, and proceed to ulceration in the mucous membrane of the alimentary canal, yet without causing such a degree of uneasiness or pain as our observations of this process in other textures would lead us to expect. In some instances, even, if we are to trust the testimony of patients, there is no proof that, in the course of a process of inflammation and ulceration of the gastric or intestinal mucous membrane, any pain has been felt until the ulceration had induced perforation, and thus given rise to suddenly induced *peritonitis*. Nor is it different with the organs of respiration, and the pulmonary mucous membrane. It is well known that, in many instances, bronchial inflammation proceeds to a very great length without giv-

ing rise to pain; and it is matter of daily observation, that tubercles may exist in the lungs, and proceed to disruption and the formation of *vomicæ*, without pain having been felt in their site, and with wandering pains occasionally felt on the surface of the chest only. In both cases, however, we have manifest sources of irritation. In the first case, irritation of the pulmonic mucous membrane must have been originally produced by the cause which induced the bronchial inflammation; and afterwards the inflammatory process itself, with its products, acts as a source of irritation. In the second case, it must be allowed that the presence of tubercular masses in the lungs is a great source of physiological and pathological irritation to these organs; to the bronchial membrane, to their blood-vessels, to the contiguous substance of the lungs, and occasionally to the *pleura*.

In cases of this kind, therefore, the irritation which must be admitted to exist, must also be allowed to produce other effects than pain; and, in point of fact, it produces almost uniformly a new orgasm in the vessels of the part, an injected or congested state, and eventually new secretions always of a character more or less unhealthy.

What, then, are the characters of irritation. I believe that they will be most readily found in the following circumstances.

1. Presuming that all the organic textures, but especially the mucous membranes, possess a certain form of organic sensibility, or a variety of *coenaesthesia*, by virtue of which they are made to act in a healthy manner under the influence of natural stimuli, *e. g.* fresh air to the tracheo-bronchial membrane, good food and mild unstimulating fluids to the gastro-enteric membrane, and natural healthy secretions and excretions in the colic and rectal, and genito-urinary mucous membrane, and by reason of which they act in an unhealthy and unnatural manner when the quality of any of these natural *stimuli* is changed, or their quantity is extremely diminished or increased,—then it may be said that any one of these membranes is thrown into a state of irritation, when such changes in them take place as alter either their organic sensibility or their organic contractility, whether pain be thereby induced or not. It is the organic sensibility or *coenesthesia* which is altered, and the alteration of which produces all the abnormal phenomena either in the membrane itself, or in remote but connected organs; and

this change, or *coenesthesia*, may take place without producing any sensation of pain, of which the sensorium shall be conscious.

2. This state of irritation, however, will betray its existence by other phenomena, for instance, difficult respiration and cough, generally dry, as to the bronchial membrane, sickness and vomiting coming on in fits, as to the gastric membrane, or sometimes an irresistible and overwhelming sense of weakness and faintness, occasional diarrhoea, as to the intestinal mucous membrane, sometimes with cramps in the lower extremities and coldness of the feet, and frequent calls to void urine, as to the vesico-urethral membrane.

3. If these causes of irritation be transitory and of short continuance, they merely excite or pervert for the meanwhile the natural actions of the membrane to which they are applied; and when they are withdrawn, though the immediate effect of the irritation may continue for a little, yet, as the irritating cause is itself removed, the irritation ceases, and its effects also cease. A staff or sound, or bougie introduced through the urethra of a person in health, creates not pain so much as an uneasy and unpleasant sensation, and without producing any degree of pain, it may cause in the individual paleness of the face, succeeded by complete fainting, or paleness followed by cold sweats. A person has more than once, when I have been introducing a staff, assured me that he felt no pain in the urethra, but merely a strange or queer sensation in the epigastric region; immediately after, however, without further notice, that person has fallen down in a state of pulseless insensibility, and when he recovered consciousness, he still declared that he had no absolute pain in the urethra.

4. The secondary effects of the same instrument in a urethra otherwise sound, illustrate the phenomena of irritation. The introduction of the instrument is followed after a few hours by a serous or sero-mucous discharge from the *urethra*; but if the irritating cause be not repeated, this subsides almost as speedily, and does not recur.

Very different is the effect of the application, if the irritating agent be repeated, as may be understood from the following fact.

In a man of 76, who was labouring under stricture which had produced ulcerative perforation of the urethra, and perinæal *fistula*, the cure was attempted by the introduction of an elastic gum

catheter, which after several introductions was then left in the bladder for two days at a time. After this method was pursued for three weeks, during which it was observed that the vesical end of the catheter was always encrusted with concrete matter, the urethral fistula had nearly healed; but the patient was attacked with symptoms of fever, attended with dry glossy tongue, heavy labouring pulse, some incoherence, and a great tendency to stupor. These symptoms gradually increased, and death took place two weeks afterwards.

Upon inspecting the bladder and urethra, the mucous membrane was found red, bloodshot in patches, and covered by a dense muco-purulent fluid. The mucous membrane of the neck of the bladder was particularly red and somewhat swelled, and showed traces of incipient ulceration.

In this case, which is not uncommon, we see the effects of irritation proceeding to inflammation, yet without the development of any sense of pain.

In other cases of ordinary retention of urine, (*ischuria vesicalis*, *prostatica*, and *urethralis*,) I have seen employed, or myself employed, the practice of the periodical introduction of the catheter for days and weeks without producing pain, unless at the very moment of its entrance into the bladder, and which always subsided immediately after;—yet after the lapse of some weeks, a distinct attack of vesical, prostatic, or urethral inflammation ensued, requiring the use of venesection and other antiphlogistic remedies. In such circumstances it must be inferred, that the introduction of the instrument causes irritation, which subsides as soon as the irritating cause is withheld; and that this irritation, by being repeated, at length gives rise to inflammation.

It may be said to be one of the conditions of irritation, that when one part of any mucous membrane is thus over-stimulated, or excited in a perverted manner, another part becomes less irritable or sensible than natural; and hence we find that hebetude, or torpor, or inertia of parts, and especially of mucous surfaces, is associated with morbid sensibility and irritation. In the case already referred to, of the irritations applied to the intestinal mucous membrane, by improper food, bad secretions, or the presence of worms, we find that this hebetude, *inertia*, or torpor, is a common accompaniment. Hence in diseases of this kind *diarrhœa* follows obstinate constipation, and con-

versely, is followed by it. In some respects this accords with what may be regarded as a law of the action or process of irritation, namely, that every undue or excessive impression so far exhausts natural sensibility and mobility as to leave the part so irritated or over-stimulated, in a state of excessive languor and feebleness and unimpressibility by stimulants.

Irritation may vary according to the texture irritated. Thus there may be an irritative state of the arteries, an irritative state of the veins, and an irritative state of the nerves,—each distinct from the other. There may be separate irritation of the mucous membranes, the serous membranes, and the fibrous tissues; and separate irritation of the muscular fibres. At present we have chiefly to remark and bear in mind, that the mucous membranes are liable to five different sorts of irritation. 1. Irritation of the mucous tissue proper; 2. irritation of the mucous follicles or crypts; 3. irritation of the vessels distributed to the mucous membranes, or mucous follicles; 4. irritation of the nervous filaments accompanying the arteries; and 5. irritation of the muscular fibres subjacent to the mucous tissues in the compound organs.

These separate forms of irritation it is hardly possible to distinguish in actual occurrence, since they glide into each other by insensible transitions. Thus the irritating cause applied to any mucous membrane very soon excites the circulation in its vessels, and augments, perverts, or deranges the consequent secretion. In like manner the irritating cause applied to, or operating on, the arteries, cannot fail to derange the influence of the nerves, increasing it at one time, and perhaps diminishing it at another, since these nerves are closely entwined round the arterial twigs.

The only forms of irritation of individual tissues, which seem to be very often, if not always, distinguishable in actual experience, is the irritative state of the mucous tissue, and the irritative state of the submucous muscular tissue. From the phenomena which the irritative diseases of the alimentary canal exhibit, we know that the mucous tissue may be irritated without the muscular being affected; and, conversely, that certain causes may act on the muscular tissue and excite its motions, which do not act on the sensibility or circulation of the mucous tissue. Most frequently, however, in such organs, irritation of the mucous membrane is followed by abnormal and excessive action

in the intestinal muscular tissue. In the larynx, the inflammation or simple irritation of the mucous membrane, excites very often the arytenoid muscles to undue or irregular action.

It is further important to observe, that even different mucous surfaces are irritated in different modes and by different agents. Thus chlorine or sulphuretted hydrogen may be applied to the surface of the alimentary canal without injury; but if applied to that of the tracheo-bronchial membrane, it produces violent irritation, and may even induce inflammation. A person may take into the stomach a quantity of acidulous liquor or acidulous fruit, or sugar, honey, or any other acescent substance, without inconvenience being manifested in that organ, or in the course of the alimentary canal; but either of these substances may render the urine so acidulous, as to give rise to painful scalding at the neck of the bladder, and along the whole course of the urethra. In this case, the ureteric and vesical mucous membrane gives no indication of uneasiness. This, therefore, is an instance of irritation proper to a particular point of the genito-urinary mucous membrane.

In some remarkable cases, we see symptoms of irritation developed in one division or point of a mucous membrane, and thence pass rapidly and successively over other portions of it, ceasing in the parts first affected as it approaches to the others. Dr Bostock relates, in the tenth volume of the London Medico-Chirurgical Transactions, an instance of a singular affection of the eyes, nostrils, and chest, annually occurring in his own person. The symptoms, which commenced about the beginning or middle of June, appear to have been caused by irritation operating upon the mucous surfaces, from that of the eyes and nasal cavities, where they produced redness of the eyes, lachrymation, sometimes with darting pains of the eyeball, and sneezing, to the bronchial membrane, where they consisted in irritation of the fauces and trachea, with difficult breathing and tightness in the chest.* These symptoms were accompanied with frequent pulse, from 100 to 120, and a sense of feebleness, languor, and general oppression. It is remarkable, that, though the irritative symptoms of the ophthalmic and nasal mucous membrane came on at eight years of age, those of the bronchial membrane did not appear till after puberty.

* Medico-Chirurgical Transactions, Vol. x, p. 161.

From the foregoing observations, I trust it may be possible to understand the distinction between irritation and inflammation in a mucous membrane. The first process is more closely connected with, and more immediately dependent upon, the irritating agent or cause, and ceases in general when that is removed or eliminated from the system, or if means be taken to allay its irritation; and the reason of this is, that it is a morbid state of the physiological properties of the tissue, without change in the organization, induced by the application of the exciting cause. The second process, though originally induced by one or more causes, however, has formed with the tissue inflamed a more intimate and permanent connection. It has altered, not only its properties, but, to a certain extent, the organization of the part, by putting its vascular system in a state altogether new, and giving it the faculty of forming new but morbid products.

From this, therefore, it must be further inferred, that irritation is not only a different action from that of inflammation, but that it is an action in many circumstances short of inflammation, or lower in the scale, as it were, of morbid action. Thus, in the mucous membranes in which we most frequently see the phenomena exemplified, irritation may be engendered and continued for some time, subside, and afterwards recur, yet without inducing inflammation. But it may also, either by the frequent recurrence of its cause, or by the intensity of its application, pass into inflammation and its legitimate products. But it is to be observed, that in the former case, the action is intermittent and periodical, and admits of remissions more or less complete; whereas in the latter, it is constant, and, though it may present periods of abated intensity, it is never entirely gone. This is well illustrated by the effect of miasma in inducing local inflammation in particular organs. The phenomena of intermittent fever may be attended, as we have seen, with symptoms of irritation in the bronchial, or gastric, or intestinal membrane, obeying the type of the ague, or recurring at certain stated periods along with the paroxysm; and if the ague be checked by suitable remedies, this process of periodical irritation may never go beyond the just limits of that state. But if the ague be not checked, or if the irritation be intense, or recur very frequently, by its impression on the irritated membranes it at length excites genuine inflammation, which, if not

checked by the adoption of suitable antiphlogistic treatment, gives rise to morbid products, and alters much the structure of the inflamed membranes.

Before concluding this subject, it may seem a point of some moment to consider whether the phenomena of irritation, as evinced in the mucous membranes, depend upon the properties inherent in these tissues, or on the nerves which are distributed to them, and whether there be any facts which are capable of throwing any light upon this inquiry.

It appears, in the first place, from the various phenomena of irritation in the mucous membranes, that all parts of these membranes are not equally sensible or equally readily affected either by healthy or by injurious impressions; that all parts do not when irritated give equally distinct indications of it; and that in some parts impressions produce preternatural and irritative sensations, and in others, preternatural, irritative, and irregular motions.

An irritative impression produces in the nasal membrane sneezing, in the larynx tickling cough, and a sense of impending suffocation, with frequent motions of the larynx; in the windpipe, wheezing, panting respiration, and cough; and in the bronchial tubes, dyspnœa, orthopnœa, asthma, or absolute suffocation, according to its extent or degree.

Many of the irritative impressions in the mucous membrane of the *duodenum* and *ileum* give rise to very uneasy sensations in the skin, in the muscles, in the head, trunk, spine, and extremities, according to the more or less intimate connection of the parts, according to the degree and nature of the impression, and also according to the sex and age of the individual.

Do the violence and endurance of these impressions bear a proportion to the proper excitability of the mucous membrane if it possess such a quality, or to the number and size of the nervous filaments with which it is supplied? Let us not forget that, in some parts, the phenomena of irritation may be established, yet the consciousness of them not transmitted to the brain.

In the *second* place, it is to be observed, that several of the mucous surfaces receive nerves from two if not three different sources. Thus the Schneiderian membrane receives the filaments not only of the first pair or olfactory nerves, but of the

fifth pair; and the latter filaments, which are connected with the arteries of the membrane, are evidently destined to regulate the circulation and secretions of the membrane. The experiments of Professor Panizza afford as distinct evidence as can be expected on such a subject, that the glosso-pharyngeal nerve presides over the faculty of taste, and the lingual branch of the fifth pair ministers to that of tact and common sensibility. There is also strong reason to believe, from what we know of the other divisions of this nerve, that it presides over the circulation, nutrition, and secretions of the tongue, and consequently over those of its mucous membrane. Does it not seem likely, therefore, that the branches of the fifth pair regulate the impressibility of the facial mucous surfaces, as well as the general sensibility of the face.

The experiments of Dr Wilson Phillip on the pneumogastric nerve show how much the impressibility, as well as the action of the gastric mucous membrane, is impaired, when the trunk of that nerve is injured.

Lastly, the experiments of M. Schroeder, who divided the nerves of an extremity in dogs, and then irritated the foot, show that irritating agents, when applied to parts in which the nerves have been divided, do not produce their phenomena with equal energy as in parts quite sound. As, however, irritative phenomena still occur under the circumstances now mentioned, and also in the members of persons who have some degree of palsy, it is impossible to infer that the impressibility or susceptibility of the mucous membranes depends upon the nerves solely.

The foregoing observations on the subject of irritation as it takes place, particularly in the mucous membranes, I submit, not as a complete account of that subject, but as calculated to enable the student to understand more clearly the nature and effects of inflammation in the mucous membranes generally, and also some of the remarks which may be made afterwards on the individual inflammatory diseases incident to the mucous surfaces. These views, indeed, I have been under the necessity of accommodating more to the proportion and character of the present work than to the importance which the subject possesses, and which is attached to it by most of the Italian and French pathologists.

For more full and detailed information on this subject, I

must refer the pathological reader to the writings of Guani,* Monteggia,† Giannini,‡ Rubini,§ Bondioli,|| Fanzago,¶ Geromini,** Broussais,†† and several of his followers, especially the work of M. Goupil,‡‡, and that of one of his opponents, viz. M. Prus,§§ with the critical examination of the same by M. Broussais. ||||

Inflammation in the mucous membranes is very often the effect of previous irritation in those membranes, and is always a cause of irritative phenomena.

The interval which elapses between irritation and inflammation is various in different individuals, and under different circumstances of irritation. In some cases, as after mechanical injury, the application of chemical irritants, or the administration of poisons, inflammation may supervene almost immediately. In other cases, however, it ensues only after a long interval.

The admission of cold damp air to mucous surfaces when the body is rather heated is a very common cause of inflammation in them, especially in the case of the pharyngeal, laryngeal, tracheal, and bronchial mucous membrane; and in many instances the mere application of cold to the surface of the skin is followed by irritation and inflammation in one or more of

* *Reflessioni sulla epidemia della Liguria, 1800, &c.*

† *Istituzioni Chirurgiche, Ediz. Seconda, Milan, 1813. Vol. i. and iii. p. 7.*

‡ *Della Natura delle Febbri et del Migliore metodo di Curarle, 1805.*

§ *Reflessioni sulle Febbri chiamate gialle e su i contagi in genere. Parma, 1805, et Giornale della Società Medico-Chir.*

|| *Memoria sull' Azione irritativa, inserita negli Atti della Società Ital. de Scienze.*

¶ *Sull' Azione Irritativa in Brera Giornale di Medicina Pratica del S. Cav. V. Luig. Brera, Vol. I. Padova, 1812; and Institutiones Pathologicae. Auctore Francisco Aloysio Fanzago, Pars. I. Patavii, 1813, cap. xii. p. 196, De Irritatione, &c.*

** *Saggio d'un analisi dei fondamenti dell' odierna Dottrina Medica Italiana, &c. Articolo v. Dell' Irritatione et delle potenze irritative. Annali Universali de Medicina, Vol. xxi. Milano, 1822.*

†† *Histoire des Phlegmasies ou Inflammations Chroniques, &c. 4trieme edit. Paris, 1826, 3 vols. 8vo.—Traité de la Physiologie appliqué a la Pathologie. Paris, 1822, 2 vols.—De l'Irritation et de la Folié, &c. Paris, 1828.*

‡‡ *Exposition des Principes de la Nouvelle Doctrine Medicale par J. M. A. Goupil, D. M. P. Paris, 1824.*

§§ *De l'Irritation et de la Phlegmasie ou Nouvelle Doctrine Medicale. Par V. or Prus, D. M. Paris, 1825. 8vo.*

||| *De la Theorie Medicale dite Pathologique, ou jugement de l'ouvrage de M. Prus intitulé de l'Irritation et de la Phlegmasie. Par F. J. V. Broussais. Paris, 1826. 8vo.*

the mucous membranes, but especially in those of the air passages.

Besides this general cause of mucous irritation and inflammation, a fertile source of such phenomena in the gastric and intestinal mucous membrane, is found in one or more of the following causes; excess in eating or drinking; the use of improper or indigestible articles of food or drink; the use of acidulous or acescent alimentary articles; the use of unripe fruits; and miasmatic exhalations, applied especially while the body is heated or during sleep.

Inflammation in the mucous membranes may attack either the membrane itself, including the follicles and *lacunæ*, or it may attack only the follicles and *lacunæ*. In the former case it is liable to assume two forms, one spreading or diffusive, the other limited or circumscribed.

In the spreading or diffusive form of mucous inflammation, phenomena of irritation appear first in one division of the membrane, and thence pass rapidly over the whole surface, leaving the parts first affected as it proceeds to others afterwards to be attacked. In this form of inflammation the process rarely shows any tendency to penetrate to the attached surface of the membrane or the submucous tissue, and confines itself with great accuracy to the free surface. This is most frequently seen in catarrh and in catarrhal diarrhoeas.

In the definite or circumscribed form of mucous inflammation, on the other hand, the vascular injection and redness are confined with more or less accuracy to a particular region or spot of the mucous membrane, and show no tendency to spread along the surface of the membrane, but a very decided tendency to pass to the attached surface and the subjacent tissues.

In the spreading form of mucous inflammation, the follicles and *lacunæ* of these membranes may be affected in common with the rest of the membrane, but the disorder is in general temporary and superficial. In some instances, however, after an attack of acute spreading inflammation, while it subsides in every other part of the membrane, it lingers in the follicles and *lacunæ*, and is liable to assume the chronic form.

In another class of cases, in which irritating agents of various kinds have been long or repeatedly applied, inflammation attacks the follicles and *lacunæ*, and is confined with great accuracy to them for a considerable time. In this class of cases the disorder is almost entirely chronic, and it is particularly li-

able not only to pass to the subjacent tissues but to proceed to ulceration.

The spreading inflammation of the mucous tissues seems to bear a close alliance to mere irritation of those tissues; and indeed, in many instances it resembles it so closely that, as soon as the irritating cause has been removed or has ceased to operate, all the phenomena of spreading inflammation subside.

A good example of this species of action or irritation, proceeding to spreading inflammation, is observed in the case of serous diarrhœa, which is very uniformly the result of irritation acting on a great extent of the intestinal mucous membrane. In some instances in which this is produced by indigestible articles of food, as fat, oleaginous fish, or similar irritants, it subsides the moment that the irritant agent has, by the profuse secretion and violent action to which it has given birth, been eliminated from the intestinal tube, and leaves no trace of its action. In other instances in which a more serious and permanent lesion is inflicted, it gives rise to inflammation of the mucous membrane of the ileum or colon, or both.

The effect of irritation of the mucous membranes is various, according to the texture principally irritated. In some instances it gives rise to pain or tenderness, in others to profuse secretion, and in others to abnormal, irregular, and excessive motion where the mucous tissue is connected with muscular fibres, as in the intestinal tube.

The process of inflammation in the mucous membrane is attended with certain phenomena, which are denominated its anatomical characters; and it gives rise to certain phenomena, which are regarded as its effects.

The anatomical characters of inflammation in the mucous tissues are various shades of redness approaching to violet on the one hand, and brown on the other, depending on vascular injection of the membrane, some degree of swelling or thickening, dryness at the commencement, followed afterwards by some degree of moisture and softening, sometimes a villous and sometimes a mammillated state of the mucous membrane. Other states, as the fungous, the indurated, and the hypertrophied state, are rather effects than characters of inflammation.

In certain varieties of mucous inflammation, instead of redness there is observed a slaty gray discoloration. This is most commonly observed in the mucous membrane of the stomach, *duodenum*, or intestinal canal, and it is very often associated with

softening. Correctly speaking, therefore, it is an effect, and not a character of the inflammatory process.

The effects of inflammation in the mucous tissue consist of two classes. The first includes those changes which take place in the membrane, and the second those which take place in its secretions.

Inflammation in a mucous membrane never continues long without giving rise to some degree of thickening, which necessarily contracts the capacity of the canal. It may also produce induration, especially in those parts of membranes which are liberally provided with muciparous follicles or glands. If the thickening, with or without induration, proceed to a great extent, and thereby contract much the capacity of the canal, it constitutes what is denominated stricture. This, though incident to mucous membranes of every kind and in every region, is most common to those which line narrow canals, as the lachrymal duct, the bronchial tubes, the biliary duct, the urethra, and the ureters. In some instances it is observed in large mucous tubes, as the *œsophagus* and *rectum*.

Thickening with induration has been denominated hypertrophy. A mucous membrane is also liable to extreme attenuation or thinning of tissues; but it is not ascertained whether this be an effect of inflammation or of irritation, or of atrophy. The latter seems the most probable cause.

Inflammation may give rise to hypertrophy or unusual enlargement of the *villi*.

A very common effect of inflammation in certain mucous membranes is the formation of small but hard granular bodies, generally red or reddish-brown, and always of a cartilaginous firmness. This is most easily and frequently observed in the mucous membrane lining the eyelids. It is there styled the granulated state of the conjunctiva, and acts as a source of irritation to the eye, in which it produces and maintains chronic *ophthalmia*.

The mucous follicles are very liable to become enlarged, firm, and prominent, and more vascular than usual. But, as has been already stated, this is most usually a chronic disease.

Inflammation may produce or terminate in abrasion, ulceration, or softening.

In the first case, a part of the mucous membrane, either where it is provided with epidermis, or over a follicle, is liable, after being unusually red, raw, and swelled, to be thrown off, or to

give way at the apex or most prominent part of the gland. This occurs in the mouth and tongue, the throat, and in the colon and rectum.

In the second case, the inflammatory process proceeds to supuration, and the affected part, unable to resist the intensity of the swelling and vascular stagnation, is removed by ulcerative absorption. This may happen either with an isolated follicle, or with an agminated patch, or with the ordinary membrane, and is most commonly seen in the agminated patches (*glandulæ agminatæ*) of the *ileum*, or in the isolated follicles of the colon. It is occasionally observed in the follicles of the mucous membrane of the windpipe.

In the third case, or that in which the mucous tissue is softened, it assumes an ash-gray or slaty colour, is thick, pulpy, and softer than usual, and when pressed by the finger or handle of the scalpel, it is easily detached in shreds and patches, and the edges of the parts so separated, are ragged, irregular, and filamentous, while the filamentous tissue is exposed. This change may occur in any part of the alimentary canal, but is most frequent in the stomach. It is also seen in the interior of the womb.

In traumatic inflammation, or that from wounds, the appearances are so characteristic as to merit particular notice. If a punctured wound be made in a part of the abdomen so as to enter the alimentary canal, blood and some of the contents are discharged. But in general sufficient inflammation is established and adhesion produced, unless the wound be very large, to prevent much from escaping into the peritoneal cavity. In the meantime, however, the edges of the wound are everted or turned over towards the peritoneal side of the intestine, and they consist of mucous membrane, which is of a red colour, in general rather intense, vascular, soft, and highly villous, so that it is possible to make an impression on the red velvety part thus everted. The same change takes place in instances of intestinal perforations and *fistulæ*.

The mucous membrane of the *ileum* is liable to a particular change, in consequence of chronic inflammation. A part, or two or more portions of the ileal mucous membrane becomes of a brownish-red, a little villous and prominent, but at the same time singularly hard and rough, and as if consisting of a number of minute grains of sand instead of *villi*. The membrane is at the same time thickened. This change, which I have seen in the persons chiefly of those, who had been known to have taken large quantities of mercury, and to have been several

times subjected to the influence of that mineral, is always attended with diarrhœa, at first occasionally recurring, afterwards more frequent, and at length becoming habitual, until, either alone, or with the aid of another disorder, it brings the individual to the tomb. In most of the cases, in which I have hitherto observed this change, the patients have at the same time laboured under disease of the kidney.

In the mucous membrane of the ureters and bladder I have seen the following change. The ureters were enlarged to about double their usual size, but the interior was not proportionally dilated. The coats were thickened and indurated; and the mucous membrane was of a grayish pale red colour, perfectly rough and irregular, with numerous inequalities of no definite shape, but as hard and firm as cartilage, and about the thickness of at least a line or a line and one-fourth. A similar change with greater roughness and inequality had taken place in the mucous membrane of the bladder. This was the result of chronic inflammation.

In some instances blood is effused, and bloody spots are observed in the mucous membrane of the intestines, which is then prominent and thickened. In the bodies of children who have died of scarlet fever or measles, it sometimes happens that each of the isolated follicles of the colon becomes a spot of blood as it were, and gives the membrane the aspect of being covered with bloody spots like *petechiæ*. Upon inspection, however, the spots are found to consist of the vessels of the follicles much overloaded with blood, and sometimes a very slight extravasation. A very good specimen of this kind was shown me in the winter of 1833, by Mr Marr, at present surgeon at Penicuik, who had met with it in the colon of a child who died under measles.

The effects of inflammation of the mucous tissue are, increase in its natural secretion of mucus, alteration in its natural secretion from mucous fluid, to various forms of dense mucous fluid, puriform mucous fluid, purulent mucous fluid, mucus streaked with blood, and blood itself in various degrees of purity, and various in quantity.

These changes take place within various intervals, and proceed to various degrees of extent in different mucous membranes.

In the bronchial membrane when inflamed, the secretion of opaque puriform mucus is not uncommon, and it is often streaked with blood.

In the intestinal mucous membrane, the fluid secreted is often thick and viscid, and not easily expelled; but when the membrane is inspected after death, the whole surface is found covered by a viscid tenacious phlegm, which adheres closely to the surface of the membrane, and which is found in many parts red, raw, and a little swelled.

In certain circumstances this secretion is of a jelly-like character, and possesses in some degree a coagulable property, so that it is moulded on the interior surface of the canal, by the membrane of which it is secreted, with more or less accuracy, and over a great or less extent, with different degrees of uniformity in its thickness and tenacity.

This tendency to the secretion of plastic or albuminous mucus, as it may be termed, may take place in any of the mucous membranes, but is most common in the windpipe and bronchial tubes, in the intestinal canal, and in the womb. In the first situation it takes place in croup in children, and in the disease called bronchial polypus in adults. In the second situation it constitutes in various degrees the slimy diarrhœa, the filamentous or membranous diarrhœa, and the tubular diarrhœa; and is always connected with chronic inflammation of the membrane. In the third situation it is very common in females who labour under symptoms either of amenorrhœa or painful menstruation, and, so long as it continues, sterility is an invariable accompaniment.

The secretion of purulent matter, or, at least, opaque white fluid, not to be distinguished from purulent matter, as an effect of inflammation, is not uncommon in the mucous membranes. It takes place most readily in the inner surface of the eyelids, constituting *Blepharitis* or purulent ophthalmy, in the *urethra* of the male, and *vagina* of the female, either idiopathically, or in consequence of the irritation produced by morbid secretions or poisonous principles, as that of gonorrhœa. This secretion is a mere effect of inflammation, and requires not for its presence ulceration, as was formerly thought. It is the suppurative inflammation of the mucous membranes.

The secretion of blood, more or less pure, and more or less copious, from a mucous membrane in a state of inflammation, is not an uncommon occurrence. But it has been erroneously received by pathologists as the indication of a state different from inflammation, and conceived to furnish ground for the establishment of a particular class of diseases under the name of

Hemorrhagies. On this point it may be observed, that all the discharges of blood which have been called active, or which take place independent of erosion of the membrane, rupture of vessels, or a wound, must be regarded as the immediate effect of inflammation in the membrane, sometimes passing to the subjacent tissue. All of them are preceded by irritation of the membrane, more less injection of the vessels, sometimes very great congestion, thickening and swelling of the membrane, and either a dry state of the surface, or a secretion of morbid mucus. In the bronchial tubes, we find, previously and along with it, that the membrane is covered by brownish, blood-stained, viscid mucus. In the intestinal tube, the mucous membrane is very uniformly more or less red, sometimes extremely so, and of a uniform crimson colour, with a villous or rough granular state of the membrane, and some thickening and induration. These phenomena are clear indications of the existence of the inflammatory process.

These are the principal changes in the secretions, which are the result of the inflammatory action. Any others will be more conveniently mentioned under the respective heads of each disease. I have now to treat of the inflammatory disease of the individual mucous membranes, which I shall do in the following order, according as they take place, I. In the cephalic or facial mucous membrane; II. In the tracheo-bronchial mucous membrane; III. In the gastro-enteric mucous membrane; IV. In the genito-urinary mucous membrane; and, V. In the mammary mucous membrane.

a. Cephalic division.	{	Eyelids and eye,	Ophthalmia.	Blepharitis.
		Nasal duct,	Epiphora.	Dacryocystitis.
		Nasal passages,	Coryza.	Ozena.
		Tympanal cavity.	Tympania.	Otorrhœa.
b. Tracheal division.	{	Mouth and throat,	Aphtha.	Angina.
		Larynx,	Laryngia.	Cynanche laryngea.
		Trachea,		Croup; catarrh.
		Bronchial membrane,	Bronchia.	Bronchitis, catarrh.
c. Alimentary division.	{	Œsophagus,	Œsophagia.	Inflammation of œsophagus.
		Stomach,	Gasteria.	Gastric catarrh.
		Ileum,	Enteria.	Catarrhal diarrhœa.
		Colon,	Colonia.	Dysenteria.
d. Urinary division.	{	Ureter,	Ureteria.	Ureteric inflammation.
		Bladder,	Cystidia.	Catarrhus vesicæ.
		Urethra,	Urethria.	Gonorrhœa, blennorrhœa, &c.
		Womb and vagina,	Metria.	Leucorrhœa, Medorrhœa.
e.		Mammilla,	Mastosis.	Mastorrhœa.

A. Cephalo-facial Mucous Membrane.

§. I. Ophthalmy, *Ophthalmia*. *Ophthalmitis*, Frank. *Ophthalmie*, French. *Ottalmia*, Ital. *Augentzündung*, German. *Blepharitis*, Purulent Ophthalmia.

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The attention which has been given to inflammatory diseases of the eye, and the numerous elaborate treatises which have been written on them, and their consequences, have necessarily added very much to our information on this subject. At present I do not propose to consider this disease and its modifications so minutely as professed ophthalmological writers have done; and, while I make a general reference to the authors now enumerated, I proceed to give a short account of the most common forms and consequences of this malady.

The division which Dr Cullen made of ophthalmia into tarsal and membranous, though adopted and followed by most subsequent writers, is objectionable, in so much as the former is found almost never to occur unless in strumous subjects, and is a part of a strumous habit; while the membranous ophthalmia is incident to all persons who have been exposed to the ordinary exciting causes. The inflammation of the tarsus and the Meibomian glands must be regarded as an affection somewhat distinct from ophthalmia, and connected with it sometimes as an exciting cause only, sometimes as an effect.

Inflammation of the eye may be considered, as in all instances, seated originally in the mucous membrane either of the eyelids or that which covers the sclerotic and outer margin of the cornea. It may commence on any part of this membrane, and, in general, spreads very rapidly over it; but is perhaps most frequently seen first on its sclerotic portion (*adnata; conjunctiva.*) Here its presence is manifested by the appearance of numerous red vessels, running through the white membrane, and the distension or enlargement of the few which can be recognized in the healthy state. At the same time the individual complains of more or less pain (*rubor et dolor,*) and the sensation of a foreign body (*sensus alieni,*) as sand, dust, in the eye, both of which are aggravated by moving the ball, and with the incapability of admitting light (*intolerantia lucis,*) the secretion and discharge of tears which are more or less hot and scalding (*lacrymatio,*) is much augmented. These form the general and essential characters of ophthalmic inflammation; but the disease presents varieties in degree, in kind, and in duration.

Ophthalmia is mild and simple, or severe and complicated; it is ordinary and unsecretory, or puriform or purulent; it is acute, subacute, or chronic.

A. The mild form of ophthalmia begins with a slight sense of

uneasiness in the eye, the white part of which is found slightly reddened and vascular, and with aversion to light, rather than intolerance. This is the state of the eye which was named *disturbance, turbidity, (taraxis)* by the older surgeons and the schools. As the disease advances, the individual complains of unnatural sense of heat, with weight, itching, and pricking, as if particles of sand or other minute bodies had insinuated themselves between the eyelids. These sensations cause him to keep the eyelids closed, and to diminish as much as may be the admission of light. If, however, they can be opened, their mucous surface is found generally reddened and villous, the white of the eye, (*adnata*) is red and vascular, and very uniformly a cluster of blood-vessels raised, swelled, and distended, is recognized in some part of it, very generally at that part to which the sense of a foreign body is referred. It does not often happen that the pulse is affected, or that any other symptoms of fever attend this form of the complaint. In irritable subjects, however, the pulse sometimes becomes a little quick in the evening, or anxiety, dry skin, transient shivering, and in some instances sickness and inclination to vomit supervene. These latter symptoms are most frequent in persons in whom the stomach, duodenum, or liver, or the gastric and hepatic functions are disordered.

This form of ophthalmia may terminate in resolution, or pass into the chronic state. Termination by resolution takes place when the redness of the membrane gradually diminishes, the vessels disappear, the pain abates, and the eye recovers its power of admitting the light. Its conversion into the chronic form is known by the diminution of the symptoms of acute ophthalmia, but with the continuance of symptoms which are known to indicate chronicity. (See below.)

B. In the *severe* acute ophthalmia, the sense of heat in the eye is burning, the eyelids are irresistibly and spasmodically shut over the ball of the eye, the weakest light is insufferable, the discharge of hot scalding tears (*lacrymatio*,) is incessant and abundant, and a glutinous fluid, which appears to be morbid mucus, or a secretion from the tarsal glands, is spread over the eyelids, and generally keeps them sticking painfully together. If the eyelids can be opened, which, however, is always difficult, and sometimes impracticable, the sclerotic mucous membrane (*conjunctiva*) is of deep red, and no point of it can be perceived more prominent or vascular than another, but the whole

membrane is uniformly distended and reddened with vessels, and rises round the cornea like an excrescence, which appears to start out of the eyelids. This general prominence of the inflamed mucous membrane round the half-concealed cornea, gives the globe of the eye an appearance which was termed *gaping* or *chasm* (*chemosis*;) by the ancient surgeons, because a small opening, corresponding to the cornea, was left in the centre of the swelled membrane. (Ware.) Scarpa, however, applies this term only when the inflammation has been so considerable as to rupture blood-vessels and produce extravasation. This distinction I conceive to be founded on a circumstance accidental and nugatory; and, if the term *chemosis*, or *gaping*, is to be employed at all to denote a particular stage of ophthalmic inflammation, I think there can be no doubt about the propriety of applying it in general to the swelled and prominent state of the sclerotic mucous membrane, which produces the appearance, whether that swelling depend on distended vessels or distended and ruptured vessels. The pupil at the same time is very much contracted. These symptoms are generally attended with febrile commotion, sometimes very considerable. The pain of the head, especially at the nape of the neck, is intolerable; the restlessness is extreme; and not unfrequently there is delirium.

Severe acute ophthalmia affects chiefly the mucous membrane and the exterior part of the eyeball; but it may be communicated to any of the interior parts, as the sclerotic substance, the iris, the ciliary circle, the choroid membrane, or even the retina. In other circumstances it may spread continuously from the mucous membrane over the sclerotic to the posterior part of the eye, and, assuming different forms, may terminate in different modes. It may terminate in resolution, ulcers, or ulceration, suppuration first of the conjunctiva, then of the eye, or it may become chronic.

The termination in ulceration perhaps only takes place as an effect of the chronic form, or when the disease of the membrane has spread either to the cornea or to the sclerotic coat.

The termination in suppuration is not uncommon when chemosis has continued for some time without showing any tendency to abatement or resolution. (Vetch, Scarpa.) The swelled conjunctiva, and the submucous cellular tissue, are then involved in a suppurating process, in which true purulent matter is discharged from the inflamed membrane, with or without

the formation of ulcers in it. In some cases abscess takes place in the membrane, and may extend to the sclerotic, or involve the other tissues of the eye.

C. The ocular mucous membrane may become the seat of inflammation with secretion of puriform or purulent matter; and it is not improbable that several varieties of this kind of inflammation may have been long known to prevail in countries and situations favourable to ophthalmic disease. Two forms, however, are described, which deserve to be well known by the physician, the purulent *ophthalmia* of infants, and the purulent ophthalmia which affects epidemically large bodies of men in close intercourse with each other.

a. The purulent ophthalmia of infants first discovers itself by redness of the eyelids, which quickly swell so much as to prevent their being opened without the utmost difficulty. This is rapidly succeeded by discharge of matter, which is at first thin and whitish, but afterwards becomes thick, yellow, and in every respect like true purulent matter. The tense swelling of the eyelids is attended with two effects; either they are so closely shut as to prevent the eye from being seen, and its state known, or they are forcibly everted whenever the child cries, so as to expose the mucous surface, which is very red, swelled, villous, and puckered into folds by the violent action of the muscles. (Ware, Vetch.) If the eyelids can be opened by the levator or speculum, the sclerotic mucous membrane is also found red, swelled, and soft, and in severe cases projects over the cornea so as to form true chemosis. After continuing in this state for eight or ten days, it may terminate in resolution, in ulcers, in specks of the cornea, or in chronic inflammation. In more severe cases it lasts four or six weeks, sometimes with much injury to the cornea, or to the deep-seated parts of the organ. (Vetch.) When it has lasted this time, it generally assumes a chronic form, and may be attended with ulceration or pustules of the cornea, with chronic inflammation of its outer plate, constituting opacity, and laying the foundation of specks, or it may, by producing opaque thickening of this coat, deprive the individual of sight, or it may produce ulceration and thickening of the cornea, and finally staphyloma. A sarcomatous or granular state of the palpebral mucous surface is a common attendant and consequence of purulent ophthalmia, and a frequent cause of the chronicity of the ophthalmia.

The causes of this form of purulent ophthalmia are, 1st, Morbid secretions of the vagina of the mother, as the matter of gonorrhœa, whites, &c. or chronic inflammation of the vagina; 2d, Imprudent exposure of the infant to cold air, or sudden vicissitudes of temperature, as in hospitals, &c.; 3d, Exposure of the ocular mucous membrane to air vitiated with bad effluvia, as in hospitals, the dwellings of the poor, &c., and to the application of filthy or morbid secretions to the eye, as by sponges, foul linen, &c.

b. Of the second form of purulent ophthalmia, we find the best examples in those epidemics which have at various periods appeared in the British army since its return from Egypt in the year 1799 and 1800. The destructive tendency of this inflammation and its unmanageable nature, after it has advanced to a certain length, have caused the medical practitioners of the army to observe its phenomena and progress with the utmost attention, and it is to their valuable communications that we owe all the knowledge which has been hitherto collected on this subject. The following description of the disease is principally from the sources now mentioned.

The first appearance of purulent inflammation is observed in the mucous membrane of the lower eyelid, which presents first a mottled aspect and then a fleshy redness. At the same time a little mucous fluid is generally found at the doubling of the membrane, where it passes from the eyelid to the globe. The disease, thus confined to the palpebral membrane, may continue in this state, which may be regarded as the incipient one, for twelve or eighteen hours, and if proper means be employed to prevent its increase, will gradually subside without further injury, and without passing to the sclerotic membrane.

When it proceeds to this membrane, which is certainly more frequent, it often extends with such rapidity, that its progress cannot be distinctly observed; in other instances it advances gradually with a defined or marginate edge, until it occupies the whole membrane to the circumference of the cornea. In this state no part of the sclerotic mucous membrane, (*conjunctiva*) appears more vascular than another, but the whole is equally and uniformly reddened and injected. The disease may be in this state before the patient complains, as the only sensation to which it gives rise is stiffness of the eye or eyelids, and the feeling of dust or sand, which, however, is not constant, but is felt at intervals only. The accession of this

last symptom is said to be most general at bed-time, or early in the morning, and it is to be understood as a mark of the progressive advancement of the disease. It is to be ascribed to the successive enlargement and distension of a vessel, or cluster of vessels, as the process of inflammation goes forward. This condition of the ocular mucous membrane, which is characterized by great and uniform redness and vascularity, without much pain, tension, or swelling, without intolerance of light, or much discharge, is to be regarded as the first stage of the disease.

According to the observations of Walther and Mueller, who observed the disease in Germany, it always commences in the inner surface or mucous membrane of the *palpebræ*; and when we consider the redness, swelling, and villous aspect which these parts invariably present in this disease, and the granulated, rough, thickened appearance which the palpebral *conjunctiva* in a large proportion of cases retains after the acute stage of the complaint is gone, it is hardly possible to doubt that this is in a large proportion of cases, if not in all, the true state of the disorder. The disease is in short *Blepharitis*.

From the beginning of the attack, the cellular texture between the conjunctiva and globe of the eye manifests a tendency to puffy swelling, which is either suddenly or gradually converted into prominent tumefaction all round the cornea, which is thus concealed by an actual *chemosis*. A similar swelling, said to be œdematous, at the same time affects the cellular tissue of the eyelids, which then project enormously, and in some instances are in consequence more or less everted. With the accession of swelling, the discharge, which was formerly moderate and consisted of thick mucus, or a scanty puriform secretion mingled with tears, begins to flow in a continued stream of yellow matter, which, diluted with the lacrymal secretion, greatly exceeds that secreted from the most violent gonorrhœa. The clothes of the individual and every thing within reach are soiled or sprinkled with it,—a circumstance which, as far as may be, should be either prevented or obviated in its effect; as the smallest quantity of the discharge is capable of communicating the disease. These phenomena affect both eyes in general simultaneously.

Previous to the appearance of matter, the inflammatory process is not attended with much uneasiness in the eye; but when it has attained the state which we have now described, the patient

begins to suffer excruciating pain, recurring at intervals. Sometimes the organ feels as if it were pierced with needles ; at other times, a violent darting proceeds right through the orbit to the temple, or from the one eye to the other ; or it is felt in a single spot, and between each paroxysm comparative ease is enjoyed. Sooner or later one of these attacks of pain is terminated by a sensation of bursting, with a gush of scalding water, to the immediate relief of the symptoms in the eye, in which this has taken place. Soon after, however, it is succeeded by a repetition of the same phenomenon either in the same eye, or in the opposite, if affected ; and these events, which consist in partial ruptures of the cornea or sclerotic, are repeated until the structure of the organ is completely destroyed,—a process which always takes several weeks, sometimes months in its accomplishment. This is the natural progress of the worst cases of purulent ophthalmia, uncontrolled by any remedial measures. During its continuance, the patient's general health is not much affected, unless in the sleepless nights occasioned by the severity of the pain. The pulse is not always above natural, the appetite is good, at least for persons not actively employed, and the general strength is quite as usual.

The ruptures of the cornea are generally followed by remission of pain and abatement of swelling ; but as the eyelids are prevented from assuming their natural state, they present a gaping appearance, and their tarsal edges are everted. Their mucous surface is also much granulated, or covered with numerous red and villous eminences ; and this latter circumstance, providing the globe has not already been destroyed, will be the source of chronic inflammation with opaque cornea.

This view of the progress of purulent ophthalmia shows the modes in which it is likely to terminate. They may be shortly enumerated in the following manner : *1st*, Resolution, if in a mild form ; *2d*, Granulated state of eyelids, in more severe cases, with or without chronic ophthalmia and opaque cornea ; *3d*, Chronic ophthalmia, with or without granulated eyelids ; *4th*, Ulcers of the cornea producing opacity ; *5th*, Ulcers and rupture of the cornea in first degree producing staphyloma ; *6th*, Ulcers and rupture of cornea producing staphyloma, with protrusion of the iris ; *7th*, Complete escape of humours and destruction of the whole globe.

On the exciting causes of this disease much discussion and controversy have prevailed. Some have maintained that in every

instance it could be traced, and was to be ascribed to contagion or contact; while others justly objected that this explanation could not apply to the first cases of the disease, and that there must have been some patients in whom it was impossible to discover the application of contagious matter. It is impossible here to enter into the consideration of this subject, and I must satisfy myself with a general reference to the writings of the various French and English surgeons on the probable mode of its generation. I shall only say that it appears to be most likely that the disease arises in two different modes. First, it appears that a form of purulent ophthalmia prevails endemially in various countries where the atmospheric temperature is rendered more powerfully morbid by the dry nature of the soil; and that this form of disease, though harmless in ordinary circumstances to the natives, is very injurious to strangers not accustomed to the climate. This seems to be the case with Egypt, various parts of Africa, some parts of Hindostan, the south of Europe, as in Italy, and through the islands and along the coasts of the Levant. Various attempts have been made from the time of Prosper Alpinus downwards to explain the endemiality of this inflammation, by ascribing it to hot burning winds, to fine dust or sand, or nitrous dust suspended in the air, to the reflection of the solar rays from a dry and sterile soil, to marshy emanations, and to the effect of the sudden transition from meridian heat to nocturnal cold. It is probable that one or more of these causes operating on persons weakened with laborious duty or otherwise liable, are sufficient to induce inflammation of the palpebral, and afterwards of the sclerotic mucous membrane. Secondly, it appears, further, that when this inflammatory process is established, and the suppurating stage of it in full action, the matter which is secreted either contains a poisonous agent, capable of communicating a similar disease, or this fluid itself possesses a morbid power.

From the concurrent testimony of Larrey, Bruant, Renati, Savaresi, and Pugnet, there seems strong reason to believe that ophthalmia in Egypt is principally occasioned by exposure to a cold and humid atmosphere. The disease is scarcely known in the upper part of Sayd, where the Nile does not overflow its banks, (Pugnet, p. 33,) and where the soil and air are dry. In the lower part of that province, however, on the other hand, and in lower Egypt generally, the disease is common; and all the observers already mentioned agree in stating,

that the disease prevailed chiefly during the wet season, when the Nile began to rise and after its subsidence, while the surface and the air were still loaded with moisture.

It must be observed, nevertheless, that a very common cause appears to be exposure of the head or whole person to the chilling impression of the night air, after the body has been relaxed by the heat of the day.

To this is to be added the consideration, that in many of the persons affected, the alimentary function had been deranged, and the circulation of the stomach, duodenum, and liver disordered by irregular living, and the observance of European habits under a tropical sun.

The arguments for the operation of the several causes now mentioned have been considered inconclusive by Lewis Frank, who infers that the true and chief cause of the disease is seated in the atmosphere, and consists in the presence of muriatic acid in vapour, or some peculiar property which irritates preferably the ocular mucous membrane. (P. 143.)

c. A third form of purulent ophthalmia is that which has been described under the name of *gonorrhœal*. This may arise in two modes. First, in an individual labouring under inflammation of the urethra from clap, the sudden suppression of the purulent discharge either spontaneously or by art, may be succeeded by inflammation of the eyelids and eye, with purulent discharge. This mode has been denied by many, and said to exist in description only; but examples of the disease, believed to be produced in this manner, are mentioned by St Ives, Astruc, Schwediaur, Bell, (Vol. i. Chap. I. p. 28.) and Lindler, (Dissert. Francofurti, 1801;) Colombier and Zimmermann notice instances of the disease which are said to have disappeared on the restoration of the blenorrhœal discharge; and in this view Richter, Scarpa, and Beer coincide. The second mode in which this ophthalmia may be produced is certainly the most common. It consists in the direct though accidental application of gonorrhœal matter to the eye, or the mucous surface of the eyelids. In whatever mode it arises, the phenomena with which it is attended, are nearly the same as those which are observed in the purulent ophthalmia of infants. Swelling and redness of the eyelids, especially of their mucous membrane, tension of the eyes, lacrymation, sense of sand or dust, and intolerance of light, are very soon attended with a copious discharge of greenish yellow opaque matter, exactly similar to that of clap. At the

same time the pulse is quickened, the skin is hot, and thirst, restlessness, and general uneasiness add much to the local sufferings of the patient. The symptoms are said to be less severe when this inflammation is occasioned by application of matter, than when it succeeds a suppressed *gonorrhœa*. It may terminate in resolution, in ulceration, *staphyloma*, or *hypopyon*, or it may give rise to chronic ophthalmia.

A pustular form of ophthalmia is sometimes observed. It consists in the appearance of minute eminences of the sclerotic mucous membrane near the circumference of the cornea. These bodies, which may be considered either as pustules, or aphthæ, are conoidal, and surrounded with a cluster of vessels which rise into them either all round in a circular area, or from one side, most commonly the temporal. When it is situate a line or two from the margin of the cornea, it is broad and flattened. It seldom under proper treatment advances to suppuration, and I have seen it disappear in thirty or forty hours after being first seen. It seems in some instances to be a point of lymph, in others to be a peculiar concentrated cluster of blood-vessels. It is not impossible for it, however, to go on to suppuration, and to form a minute abscess of the *conjunctiva*. When these pustular eminences appear on the corneal mucous membrane, they generally pass into ulcers.

I have had frequent occasion to say that acute ophthalmia is liable to terminate in the chronic form. This appears to take place in the following mode. When the acute action is beginning to subside, as is known by the abatement of pain, diminution of swelling, and alleviation of other symptoms, the vessels appear still much distended, but without giving the same uneasiness as before; the eye becomes weak and unable to bear light, or to be used in any manner with comfort; a sense of weight and fulness is felt in it; the vessels become habitually distended and varicose, and the mucous membrane (*conjunctiva*) thickened, hardened, or even relaxed.

The causes which favour the formation of chronic ophthalmia are referable, according to Scarpa, to three heads; 1st, increased sensibility and irritability of the vessels of the conjunctiva, after the cessation of the acute stage; 2d, to other diseases of the eye of which the chronic ophthalmia is the consequence; 3d, to the state of the constitution of the individual.

The first of these may be considered as the disease itself; for

the circumstances which prove its existence show also that chronic inflammation is present.

The diseases of the eye or its appendages which may generate chronic ophthalmy, are extraneous bodies between the eyelids and globe which have escaped observation; inversion of eyelashes; abscess or ulcer of the cornea, protrusion of the iris, staphylomatous excrescence, ulceration or inflammation of the edges of the eyelids, or the Meibomian glands, eruptions of the eyelids, morbid secretion of the ciliary glands, the fungous, granulated, or villous state of the mucous surface of the eyelids, enlargement of the cornea or whole eyeball, and minute insects (*morpiones*) at the root of the eyelashes or eyebrows.

The constitutional affections concerned in the production of chronic ophthalmy are almost all referable to some form of strumous disease.

Chronic ophthalmy may gradually disappear under proper treatment, or terminate in resolution; that is, without injuring the structure of the eye or any of its parts. More frequently, however, it gives rise to other diseases with which it continues to affect the eye, until more or less injury is committed on its structure. The most frequent of these are the superficial speck (*nebula*) and the triangular web or membrane (*pterygium*.) Each of these may be combined with chronic inflammation, and thus three different cases of termination are afforded.

The first of these varieties is the *simple chronic varicose ophthalmy*, with relaxation and thickening of the conjunctiva. In chronic ophthalmy, which has been neglected or improperly treated, especially in persons of strumous or otherwise lax habit, the *conjunctiva* becomes relaxed, and its vessels, chiefly the veins, yielding daily to the blood which is retarded in them, become more turgid and elevated than natural, assume an irregular and knotty appearance first in their trunks, afterwards in their branches, at the circumference of the cornea, and finally, in their minute colourless ramifications, which are distributed on the transparent membrane of the cornea. Whether similar dilatation takes place also in the minute arteries it is not easy to determine. It is certain that the return of blood by the venous vessels of the *conjunctiva* become varicose, is remarkably retarded by the feebleness of these vessels, by their knotty tortuous disposition, and also by the folds into which the relaxed conjunctiva is thrown in the different motions of the eye. In

this first stage the knotty and varicose vessels are confined to the sclerotic conjunctiva or white of the eye.

It is at the same time to be observed, that in the majority, if not the whole, of the cases now referred to, the mucous membrane of the eyelids has become, from repeated attacks of inflammation (*Blepharitis*) irritable, vascular, thickened, and not unfrequently indurated. If this state of the palpebral *conjunctiva* be present, it, with great facility and certainty, produces the second variety of chronic ophthalmia, or that in which distinct *nebula* is formed.

The palpebral *conjunctiva* is then not only thickened and indurated, but its surface is covered by many minute prominent bodies, irregular in size, shape and elevation, but all tending to the round figure, and all concurring in rendering the surface rough, irregular, and more or less hard and cartilaginous, so as to act as a perpetual source of mechanical and physiological irritation to the mucous membrane of the eye itself.

In this state of the palpebral and ocular *conjunctiva*, as the vessels of the latter are subjected to a perpetual source of irritation, the inflammation which is thus induced is in proportion lasting, uninterrupted, and extensive. The disease is no longer confined to the vessels of the sclerotic *conjunctiva*; but a number of minute red vessels are observed to shoot from that membrane across the cornea, from its circumference towards its centre; and in no long time around these is effused a thin milky or albuminous fluid, which at that part impairs the transparency of the cornea, and renders it dim and obscure. In this manner is produced in that transparent tunic, a degree of cloudiness, to which the name of *Nebula*, or *Nubecula* has been applied. The fluid is said by Scarpa to be effused on the external surface of the *cornea*, that is, between that membrane and the thin transparent conjunctival production. When it has once commenced it proceeds often to a very great extent. At its first appearance there may be merely one nebulous point which may afterwards be enlarged. But in general two or more points appear, and coalescing, render the cornea more or less dim and nebulous all over, and impair much the vision.

The *Nebula* or superficial nebulosity is to be distinguished from opacity of the cornea, in consequence of acute severe ophthalmia. In this case the effused matter consists of coagulable lymph, which is extravasated into the inner texture of the cornea, that is, in the substance, and between the *laminæ* of

that membrane, and it has a tendency to destroy the organization of the cornea, or it may be matter, or in an abscess which proceeds to ulceration.

In extreme cases of *Nebula*, the cornea is almost entirely opaque, and vision is completely lost.

In the third variety of chronic ophthalmia, that, namely, with *Pterygium*, or the triangular web, the disease assumes a form still more intense and obstinate. Besides the enlarged, knotty, and varicose state of the vessels of the *conjunctiva*, extending over a certain space of the *cornea*, as in nebula, the conjunctiva itself becomes thickened both on the sclerotic and also on the cornea, and presents the aspect of a new membrane. It is nevertheless only the sclerotic conjunctiva thickened, and the thin transparent plate of that membrane prolonged over the cornea, which has been converted into a thick opaque and rather hard tissue, traversed by numerous vessels, and interfering very considerably with the function of vision.

The *pterygium* is always triangular in shape, with the base on the white of the eye, and the apex on the *cornea*, more or less distant from the centre of that tunic. Most frequently it proceeds from the internal or nasal angle of the eye, and is solitary. In some rare cases, however, there are seen webs proceeding also from the external or temporal angle, and in others from the superior or the inferior hemisphere of the eyeball; and in cases still less common there are observed on the same eye, two or three *pterygia* or webs of different sizes, arranged at different distances from each other, in the circumference of the eyeball, with their *apices* directed towards the centre of the cornea, where, if they happen to approach and coalesce, they cover the whole surface of the cornea with a dense veil, and cause complete loss of sight. To this complication of the effects of chronic ophthalmia, the ancient physicians applied the name of *Pannus*.

TREATMENT.—The use of the history now delivered is to show the necessity of sufficient activity and promptitude in the employment of remedial measures to prevent the disease from proceeding to these unfavourable terminations.

In every kind and form of ophthalmia, it is requisite to treat the disease as one more or less, sometimes highly, inflammatory, and to adopt the use of the antiphlogistic treatment more or less fully, according to the intensity of the symptoms, and the amelioration furnished.

These consist, in blood-letting, general and local, emetics, cathartics, antimonials in nauseating doses, revellents, and low diet.

It is also important to employ local applications of various kinds. In the acute stage, the milder are the best, as warm fomentations, either with tepid water, or with the decoction of poppy capsules or mallow. Afterwards, and in the chronic form of the disease, the sedative and astringent applications are most suitable, as white vitriol, sulphate of zinc, alum, (sulphate of alumina or potass) or sugar of lead, or even simple cold water, applied by means of pledgets over the *palpebræ*.

It is sometimes of great moment to shave the head, and apply cold occasionally.

The use of general blood-letting has been supposed to be confined to the acute form of *ophthalmia*; but I have seen many instances of the chronic form of the disease, which, after resisting local bleeding by means of leeches and the use of other local measures, gave way speedily to a full bleeding from the arm.

In the purulent *ophthalmia*, it is generally indispensable to draw blood to a great extent. But the disease requires the use of various local applications, which are conceived to exert a specific influence on the morbid state of the palpebral mucous membrane and its conjunctiva. Of these the nitrate of silver is by far the best; and a solution, either of five grains to the ounce, gradually increased to ten grains, or of ten grains at once, should be without delay applied to the inner surface of the palpebrae. The camphorated water of Bates, a suspension of Armenian bole and camphor in a solution of alum, which was strongly recommended by Ware, and afterwards by Scarpa, has been also supposed to be highly efficacious. It may do very well in the purulent *ophthalmia* of infants, in which, there is reason to believe, Mr Ware principally used it; but it has been found to be a very inadequate and inert agent in the purulent *ophthalmia* of adults, and in that of Egypt in Europeans.

Vasani, an Italian physician, states, that he effected wonderful cures in the treatment of a contagious purulent *ophthalmia* at Ancona, by means of a solution of from ten to fifteen grains of tartrate of antimony in a pound of water, applied as a collyrium to the inflamed membrane.*

* Scarpa, Trattato degli Principali Malattie degli Occhi. Edit. vta. Pavia, 1786, Vol. i. p. 217.

Wardrop proposes to puncture the cornea, and evacuate the aqueous humour, with the view of preventing disruption of the tunics, and disorganization of the eyeball. *

When ophthalmia is known or suspected to proceed from, or be complicated with, gastric or rheumatic disorder, it is particularly requisite first to remove these ailments. For the first complication, full vomiting, and afterwards cathartics, are indicated; and it may then be requisite to apply leeches to the epigastric region, and afterwards to use some of the light tonics. For the second complication, the most effectual remedy is opium, either alone or with calomel; but it is always, at the same time, necessary to employ cathartics alternately. In some instances sulphate of quinine is most effectual.

For the chronic forms of the disease, revellents, as blisters, issues, and setons are indicated; and the local use of the vinous tincture of opium, and weak citrine ointment, is of much benefit.

§. II. *Epiphora*, Watering Eye. *Dacryocystitis*, J. Frank.

Chirurgical Observations. By James Ware. Vol. i. p. 319.—Chirurgical Works of Percival Pott. Vol. i. p. 223.

The term *Epiphora*, Influx, or Inbringing, has been used by systematic and other authors, to denote simply, a flux of the tears, or what has been called the watery eye, whatever might be the cause of this discharge, whether augmented secretion or obstruction of the natural passage. I at present restrict it to express a spreading inflammation of the membrane of the lacrymal passage, by which this passage undergoes a temporary obstruction, sufficient to produce the symptoms of discharge of tears from the eye and eyelids. Its presence is indicated, not only by this phenomenon, but often by pain and tenderness, with more or less swelling between the nasal angle of the eye and the base of the nose, along the course of the lacrymal sac and duct, stiffness and swelling of the eyelid of the affected side, and more or less villous redness along the palpebral conjunctiva.

The villous or mucous surface of the eye and eyelids communicates with that of the nostrils by a narrow tube or conduit termed the lacrymal duct. A minute capillary opening at the

* On the Effects of evacuating the Aqueous Humour in Inflammation of the Eyes: London, 1816.

inner or nasal extremity of each eyelid, termed lacrymal *point* (*punctum lacrymale*,) forms the upper or palpebral end of this canal, and its inferior or nasal extremity is a considerable opening in the lower nasal passage, beneath the lower spongy bone. When it is said that this canal, which is very narrow, is invested with mucous membrane, it is understood that it presents a free surface, moistened with a thin, semitransparent, glairy fluid, not like the mucus of the nostrils or trachea, but merely viscid enough to facilitate the descent of the tears from the eyelids, and to maintain a free communication between the eyelids and nostrils. This membrane may become inflamed in any part of its course, and will give rise to the symptoms enumerated above. The most common site, however, for the inflammatory action to take place, is at the upper or palpebral end, perhaps from the small size of the openings, and from the facility with which they may be obstructed in diseases of the eye and eyelids.

Inflammation of the lacrymal duct, indeed, seldom takes place, unless in connection with some affection of the eyelids or the Meibomian glands; and Scarpa has taken some trouble to show that it is generally preceded by puriform discharge or inflammation of the eyelids, and an unsound state of the Meibomian or tarsal glands. In this case, however, the disease is somewhat different, and assumes a chronic character, and is generally connected with a strumous disposition in the mucous surfaces. My purpose requires that I should speak first of the simple or acute form of epiphora; after which I shall notice its connection with the more tedious and unmanageable varieties of the disease.

I said that the membrane of the duct may be inflamed at any part of its course, but is most commonly affected at the upper or palpebral end. The disease generally commences with uneasiness and stiffness of the inner canthus of the eyelids, which soon become painful and swelled, while the eye waters without intermission, and at length a hot, viscid, mucous fluid is poured out over the cheeks, and adds considerably to the distress of the patient. The pain extends from the *canthus* down toward the nostril, in some instances across the glabellar region, and not unfrequently towards the temple. The nostril of the side affected, sometimes, also, that of the other side, is completely dry. The pulse is very rarely affected; and in ordinary circumstances, the disorder, though severe and distressing as a lo-

cal affection, does not cause any disturbance in the general system.

These symptoms are mostly referable to the inflamed and swollen state of the lacrymal membrane. As the passage is narrow, and the orifices minute, a moderate degree of swelling produces a temporary obliteration and much painful tension, and prevents the tears and other fluids of the eyelids from pursuing their natural course. Hence the watering eye, excoriated cheek, and dry nostril, and the painful tension along the corner of the eye and nose.

The termination of this disease will be understood by reflecting on the usual terminations of inflamed mucous surfaces, and on the peculiarities of the canal. Under favourable circumstances, and with suitable treatment, it may be resolved in the course of a few days, without injury to the parts affected. This may be anticipated by the gradual diminution of swelling, alleviation of pain, and diminution or disappearance of discharge, which, indeed, at once becomes more natural, and resumes its usual course when the duct becomes again pervious.

When this desirable result does not take place, either the inflammation, by its continuance, becomes chronic, while the swelling continues to obliterate the passage, or it may be contracted by stricture, the effect of the inflammation, or obstructed by morbid secretions. In either case, the disease continues in some degree to subsist, and is accompanied with more or less injury to the texture of the canal, or the contiguous parts. If the canal be obstructed by stricture, adhesion, or morbid secretion, the adjoining parts not unfrequently undergo a secondary inflammation, which terminates in ulceration and false openings. If the original disease become merely chronic, it may produce stricture or adhesion of the walls of the canal, and the same train of events will follow. In all cases there is danger of the *periosteum* investing the lacrymal bone, and the nasal or upper maxillary bones becoming inflamed, and thus rendering the bones carious. A variety of phenomena thus take place, which finally terminate in the disease, denominated by surgeons lacrymal *fistula*.

The description thus delivered applies to the idiopathic or acute form of *epiphora*. Other forms, however, frequently occur as symptomatic of disease of the eyes, eyelids, or some of the bones. Strumous affections of the tarsal glands are es-

teemed the most frequent causes of these symptomatic and chronic varieties of epiphora. Syphilis has been known to precede it, and a multitude of cases have resulted from the repeated doses of mercury, which have been given to remove a syphilitic attack. The *epiphora* thus formed differs from the one already mentioned, only in being more permanent and more obstinate; in all other respects it is the same.

In the treatment of acute *epiphora*, the object of the practitioner, if called in time, is by every means to promote resolution, and prevent the disease from becoming chronic, passing into the suppurative stage, or producing stricture or adhesion of the walls of the duct. The most probable method of accomplishing this purpose is the employment of local bleeding by the application of leeches, cooling lotions, and every remedy which may control the inflammatory action. In general, the blood removed by eight or ten leeches, once or twice applied, has an obvious effect in reducing the swelling and diminishing the pain. Low diet, and the saturnine lotion, or cold water, will likewise be very useful auxiliaries. In the chronic state, repeated application of leeches is most useful, and if the symptoms continue, the counter-irritation of an issue, or seton, is the most likely means of removing the disease. When stricture or adhesion has taken place, the disease must be treated according to the rules prescribed by modern surgery.

In the symptomatic variety of *epiphora*, the original or generating disease must be removed, while the *epiphora* itself is to be palliated.

§. III. *Coryza*. *Gravedo*. Schnupfen, German. Snuffles, English. Cold.

Conrad. Ant. Schneider de Catarrhis, lib. v. sect. i. Viteberg, 1655 and 1670.
—G. Wolfgang Wedelii, Dissert. Casus laborantis Coryza, Jenae, 1673.—
Franci, Dissertat. de Coryza, Heidelberg, 1685.—Camerarii, Dissert. i. et ii. de Coryza sicca, Tub. 1689.—Scaperi, Dissertatio de Coryza, Rostoch, 1711.—
A Treatise of the Disease called a Cold, by John Chandler, F. R. S. 2d edit. London, 1761.—Swiederskii, Dissert. de Coryza, Vilnae, 1819.

This term has been applied by medical writers to inflammation of the mucous membrane of the nostrils and the facial cavities. Its presence may be recognized, it is said, by dryness and swelling of the nostrils, succeeded by the discharge of a thin sharp fluid, tickling and frequent sneezing, and pain and weight of the forehead. It may be doubted whether this

disease ever exists, unless as a part of a more general affection which extends not only over the nasal but the laryngeal and bronchial mucous surface. As a preliminary part of this affection in measles and small-pox, *coryza* is common and uniform, sometimes subsisting through the whole course of the disease; but it seems very doubtful, indeed, if it ever occurs as an insulated and distinct distemper. For its history, therefore, as a part of bronchitis, I refer to the account of that disease.

I must not, however, omit to observe, that there are symptomatic or secondary forms of this affection, which are unconnected with bronchial inflammation. Such is the *coryza* which occurs in nasal polypus, in local disease of the *antrum*, and previous to *ozaena* or *caries* of the spongy bones, whether from a strumous or syphilitic origin. The *coryza* occurring under such circumstances should lead the practitioner to inquire into the state of the nasal, or intra-maxillary mucous membrane, and, by the history of the case, to determine its cause, and regulate the treatment accordingly.

§. IV. Ear-ach. *Otitis*. *Otorrhœa*.

In ordinary circumstances this disease begins with a sense of uneasy itchiness in the ear-hole or external passage, which is soon changed into pain, sometimes acute, sometimes more sufferable, always accompanied with hissing, tingling, and a degree of imperfect hearing. If the lining membrane in this state be examined at a bright light, which, however, is rarely practicable, on account of the extreme sensibility of the parts concerned, it will be found red and swollen. A probe inserted gives extreme pain, and at intervals the patient complains of acute pain darting from the ear-hole laterally, or through the head. After a few hours, in some cases a whole day, a yellowish puriform, very fetid discharge, is observed to flow from the external auditory passage. The quantity varies with the degree of inflammation, and in severe cases it is sometimes preceded by a serous or even a bloody exudation. The consistence of the discharge does not appear, as in most catarrhal excretions, to augment progressively, but varies considerably in the same week, and even in the same day. Its ordinary duration is from fifteen days to three weeks, after which the fluid discharged becomes decidedly thicker, and in colour, consistence, and even odour, resembles caseous matter.

After this period the discharge generally disappears, and is succeeded for some time by a copious ceruminous secretion.

This disease, though generally slight, is, in some unfavourable cases, tedious and unmanageable; in strumous or other bad subjects it may become chronic; it may give rise to thickening, or inflammation and subsequent ulceration of the tympanal membrane; or it may by gradual extension ultimately affect the bony part of the canal.

It may be idiopathic and primary, or it may be connected with syphilis, itch, or small-pox. It sometimes succeeds measles or scarlet fever.

When it affects the investing membrane of the canal more deeply, it has been deemed by nosologists rather a phlegmonic than a catarrhal or mucous disease. The distinction is of little practical use, and there is no doubt that the catarrhal or true *otitis* may affect the deeper tissues, and that, *vice versa*, the deeper tissues may, when inflamed, give rise to inflammation of this membrane.

The treatment consists in abstraction of blood, generally and locally, as the circumstances of the case indicate, the liberal administration of cathartics, and abstraction of the disturbing effect of light and sound. Of local remedies beside leeches, it is not always easy to decide on the general propriety. Blisters have been said to aggravate the disease, and are reported in some instances, when applied for a different purpose, to have produced inflammation of the auditory tube. Cold or saturnine applications have been believed to have little effect, and sometimes to be feared for producing an internal disease by too violent repulsion. Perhaps the best local application is to be found in the warm decoction of poppy, and in other emollient applications. But as on this head no general rule can be delivered, the medical attendant will do well to watch the effect of his remedies, and to be much guided by the feelings of his patient. When *otitis* has become chronic, it is best managed by the repeated application of leeches behind the ear or in the ear-hole (*meatus auditorius*,) occasional blisters, setons or issues in the neck, and sedulous attention to the state of the intestinal canal. If the patient be delicate and strumous, nutritious diet, which does not stimulate or overload the alimentary function, may be allowed; and the judicious administration of some of the tonic re-

medies, as muriate of lime, muriate of iron, sulphuric acid or sulphate of quinine, will be beneficial.

§. V. *Tympanitis*. Internal Ear-ach. Inflammation of the Tympanal cavity, Mastoid Cells, Eustachian Tube.

This important disease consists in an inflamed state of the membrane which lines the cavity of the tympanum, mastoid cells, and upper or tympanal end of the Eustachian tube. This membrane, as it is continuous with the mucous membrane of the throat and posterior nostrils, has, therefore, been considered as of the same kind. Accurately speaking, however, it is somewhat different. Its free or unadherent surface is much smoother than the nasal or guttural membrane, and it presents none of the minute elevations or piles which distinguish the latter. Neither does it in the healthy state secrete any mucous fluid similar to that of the nasal membrane. On the contrary, it is a smooth uniform surface, moistened with a thin watery fluid, which, however, never seems to accumulate in any quantity in the state of health. If removed from the contiguous parts, and dried, it becomes semitransparent. Its adherent surface cannot be well distinguished from the periosteum of the bones to which it adheres, and it may on this account be referred to the order of fibro-mucous membranes. I look on it as a membrane of a peculiar character, both anatomically and pathologically; but as it is continuous with the mucous surface of the nostrils and throat, I place its inflamed state here as its more convenient situation.

When inflamed it gives rise to more or less pain in the *meatus* and ear, aggravated by noise, speaking, and mastication, and intolerance of sound succeeded by deafness. Like most inflammatory affections, it occurs under various forms, which, for the sake of brevity, may be referred to the general heads of acute and chronic or lingering. In the first the pain is violent in degree and sudden in attack, and is generally the first symptom of which the patient complains. It is accompanied with much tension and occasional darting through the head, and is aggravated by sound, and motion of the under jaw.

The state of hearing varies according to the progress of the disease. In the beginning it is always morbidly acute, so that the slightest sound is very painful;—afterwards this seems to diminish; until it is much impaired or complete deafness of the affected side ensues. At the same time with the pain, the throat

is sometimes affected with swelling and uneasy roughness, referred to the guttural orifice of the Eustachian tube, and not unfrequently the tonsils are enlarged, or the investing membrane is generally reddened; while the appearance of the external ear-hole is natural. This is supposed to be pathognomonic of tympanitic inflammation; and it would be so, were there no other circumstances to modify the conclusion drawn from these. But this cavity may be inflamed without affection of the throat; and external *otitis* or *otorrhœa* may precede the interior inflammation. It is generally accompanied with some disturbance in the system. The pulse is somewhat quicker than natural, and in some cases it is much accelerated, with heat, thirst, and restlessness.

After the inflammation has continued for some time, it may terminate either in resolution, in suppuration, or in adhesion of some part, and obliteration of the cavity of the tube or mastoid cells. The termination in resolution may be anticipated by the early cessation of the pain, and restoration of the function of the parts. But if the pain either continue long, or be alleviated without restoration of hearing, the effusion, either of mucous or purulent fluid, is to be feared. The matter formed may escape by three channels; the Eustachian tube, the membrane of the tympanum destroyed, or a spontaneous opening through the mastoid cells. The first is least common, and most favourable. The second is the most usual mode in which the disease terminates. After a sudden and copious discharge of viscid matter streaked and mixed with blood, the internal swelling and pain subside, and the communication through the Eustachian tube, which is generally obliterated during the inflammatory process, being restored, a direct communication is established between the throat and external ear-hole. This is readily known by the impulse, which the flame of a candle placed at the ear, receives from the current of air forced out by expiration, while the nostrils and mouth of the patient are closed. The opening through the mastoid cells is not common; but it may happen, especially when the inflammation has been more particularly confined to that region of the tympanum. This event is preceded by pain and redness of the skin over the mastoid process, which at length undergoes a suppurative inflammation, with more or less violence and extent of injury.

The termination of *tympanitis* in suppuration is succeeded

by various other morbid changes, which pertain to surgery, and for the detailed consideration of which I refer to treatises on surgery.

This disease may be idiopathic, or consequent on some other. It is frequent after continued fever, scarlet fever, small-pox, malignant sore throat, and, in some instances, measles. It generally attacks young persons of fair or sanguine habit, but delicate structure; and, though liable to occur at any period of life, is not frequent among the aged. The strumous diathesis seems to be favourable to its formation; but the disease certainly occurs in persons in whom it is impossible to recognize this disposition. In some circumstances it is connected with chronic inflammation of the brain or its membranes; and in all cases it is liable to spread from the tympanal membrane through the labyrinth to the cerebral surface of the petrous portion of the temporal bone, and in this manner to induce meningeal inflammation, which may terminate fatally.

The exciting causes cannot be distinctly specified. Cold, especially from the continuance of east wind, and sometimes external injury, are blamed as the first agents in inducing the disease.

The treatment is comprised in a narrow compass. Blood-letting, general and topical, in such quantity as has a decided effect on the symptoms, with every other part of the antiphlogistic regimen, are the most certain means of promoting resolution, and preventing suppuration. If, after the employment of blood-letting, general and local, with adequate and efficient purging, and the occasional employment of antimonials, the discharge continues, with dull pain deep in the ear, or in the site of the mastoid process, the application of a blister once or a second time, is often followed with abatement and ultimate cessation of the discharge. If pain, heat, or fulness over the mastoid process continue, it is desirable to make an incision down to the bone, and allow it to heal very slowly.

§. VI. Thrush. *Aphtha*; *Febris Aphthosa*. Le Muguet; Le Millet; Le Blanchet, French. Die Schwämmchen; Mehlhund, German.

Vincent Ketelaer, Commentarius de Aphthis nostratibus vulgo de Sprow. Lug. Bat. 1672.—A. Bergen, Dissert. de Aphthis. Francofurti, 1733.—Colombier, in Histoire de la Société Royale de Médecine, 1779, p. 186.—Van Der Belen, Dissert. de Aphthis. Lovaniæ, 1783.—Joh. Christ. Stark, Ab-

handlung von den Schwämmchen. Jena, 1784.—Lebr. Frid. Benjamin Lentin, Dissertatio de Aphthis praemio. Reg. Societ. Med. Paris condecorata, 1787, apud Frank Delectum, xi. p. 273, et Beitræge zur Ausubenden Arzneywissenschaft. Lips. 1789. P. 240.—Justi Arnemann, Commentat. de Aphthis, Goetting. 1787.—Auvity in Memoires de la Societé Roy. de Medecine, 1787, 1788, p. 122.—Coopmanns in libro eodem, 1787, 1788, p. 215.—Woost, Dissert. de Aphthis Infantum. Vitebergae, 1790.—Posewitz, Dissert. Semiologia Aphtharum Idiopathicarum et Symptomaticarum. Vitemb. 1790.—Doering, i. p. 210.—Caspari, Dissertatio de Aphthis. Goetting. 1797.—Mayerhauser, Dissert. de Aphthis. Francofurti, 1797.—Steinhauser, Dissert. de Aphthis. Viteberg. 1802.

SEMOGRAPHY.—The term Thrush or *aphtha* has been applied to designate certain minute whitish or pearl-coloured elevations of a vesicular character, which appear in the mucous membrane, chiefly of the lips, mouth, and *fauces*. They appear often so suddenly, that it is difficult, if not impossible, to trace their origin and progress. In general, however, when first seen, they are small and lenticular, affecting the circular or oval figure, whitish, or of an ash-gray colour, very slightly raised, containing a serous, glutinous, or puriform fluid, which, upon the bursting of the summits, is discharged, and discloses a surface either foul and ash-coloured, or reddish.

Aphthous elevations, examined with attention, are found to consist of a thin semitransparent pellicle, covering a small quantity of fluid. This pellicle is manifestly the mucous epidermis, elevated and detached from the corion by the newly secreted fluid; and this accords with the fact, that aphthous vesicles are observed only in those regions where the mucous surfaces are provided with *epidermis*.

They appear most frequently in the mucous membrane of the mouth, on the inner surface, or at the angles of the lips; on the *prolabium*, or the thin florid semi-mucous membrane of the lips; at the inner surface of the cheeks; and on the palate, tongue, and *fauces*. As they have been observed in the *pharynx* and *oesophagus*, they have been represented to descend along the whole course of the intestinal tube. But this statement wants confirmation; and though in the cases in which aphthous vesicles appear in the mouth, there is often disease in the intestinal mucous membrane; that disease does not consist in the presence of aphthous vesicles, properly so called. They are sometimes, but not often observed in the tracheo-bronchial mucous membrane. They are much more frequent

in the vagina of the female, sometimes in the angle between the prepuce and glans of the male, and in the mucous membrane of the anus and rectum in both sexes.

Aphthous vesicles rest on a base more or less red, and disagreeably hot. When ruptured spontaneously or accidentally, the mucous epidermis is detached in the form of thin soft crusts or plates, leaving sometimes a broken ulcerated surface, sometimes a surface which is speedily covered by a new epidermis.

Aphthous vesicles are in all situations attended with a disagreeable sense of heat, soreness, and rawness of the part; and in particular regions they give rise to peculiar effects. In the mouth, they render mastication, sucking, or speaking difficult and painful, are attended with more or less ptyalism, and cause much suffering when hot or pungent articles of food or drink are taken. In the windpipe, they cause hoarse cough, and more or less *aphonia*. In the *fauces*, *pharynx*, and *œsophagus*, they render deglutition difficult and painful. In the vagina, they cause heat and painful micturition.

Aphthous vesicles have been distinguished into the primary or idiopathic, and the secondary or symptomatic.

The primary or idiopathic Thrush is a disease chiefly incident to the early or infantile age, and is rarely observed beyond the period of lactation. Its appearance is preceded by sickness, with occasional vomiting, somnolence or sleeplessness, heat of the surface, and, above all, of the mouth, and considerable restlessness and anxiety. The somnolence is of that kind, that the infant does not evince the usual sensibility to the natural stimuli of hunger and thirst. The motions are at the same time observed to be scanty and viscid, or slimy, or whiter than natural, and sometimes there may be diarrhœa, generally of clay-coloured discharges. Lentin states that the urine is so abundant, that the clothing is constantly wet, and he seems to regard the symptom as pathognomonic. This is liable, however, to so many obvious fallacies, that no physician can attach to it much importance.

At the same time the nurse may in general recognize the extreme heat of the mouth; and about the third day after the first symptoms of disorder have appeared, the infant, however eager to take the breast, is observed to do so with pain and

wailing whenever the mouth is applied to the nipple, and attempts to suck or swallow are made.

In the meantime numerous minute whitish or pearl-coloured specks are observed at the angles of the lips and along their inner surface, on the tip and margins of tongue, and, when the child cries and opens the mouth, on the inside of the cheeks and on the palate. At first these specks are solitary and distinct, but in the course of a day or two they coalesce in patches of various sizes. In the course of three or four days the vesicles which first appeared, break, and the exposed surface is whitish, as if sprinkled with meal or flour, until the mucous epidermis is separated in crusts or shreds, after which either the raw surface begins to form a new epidermis, or another crop of vesicles may succeed, with great increase in suffering and distress to the child, who is not only wasted indirectly by the disorder, but directly by the want of food and drink.

According to Lentin, the process of eruption may proceed in this manner in clusters for the space of nine days, so that not only the whole internal surface of the mouth, as far as is visible, and over the *prolabia* of the lips, is covered by vesicles, but they are observed at the anus,—a circumstance from which he inferred their existence along the tract of the intestinal tube.

While this process is advancing in the mucous membrane of the mouth and *fauces*, the skin is dry and rather hot, the motions are frequent and slimy or greenish, the urine is scanty, resembles soap lea, and is voided with much pain; and the voice is hoarse, and hiccup is frequent.

In some instances, which must be regarded as of a malignant character, the spots or their exposed bases become yellowish, brown, or violet-coloured; the infant vomits frequently and whines with a hoarse peevish voice, and cries from pains of the belly; the *diarrhoea* continues with the discharge of slimy stools and shreds; and, after much suffering and wasting, dies as it were atrophied.

The duration of the disease varies according to the constitution of the infant, the treatment employed, the local situation, and the character of the climate and season.

The disease is seldom over in less than nine or ten days; and in severe but chronic cases it may be protracted for weeks or even months.

The secondary or symptomatic variety of aphthous eruption is observed almost solely in adults. It occurs chiefly in the course or at the close of fevers, especially those of gastric character, pituitous or mucous, gastrico-nervous and catarrhal, in measles, dysentery, and chronic diarrhœa, in scurvy, pulmonary consumption, and *lues venerea*.

In the latter class of diseases, as chronic diarrhœa, and dysentery, and pulmonary consumption, without a positive eruption of aphthous vesicles, the whole mucous epidermis of the tongue and several of the inner parts of the mouth may be detached in shreds almost insensibly, leaving the exposed surface preternaturally red, smooth, and tender, and causing a good deal of suffering to the patient.

In some instances apparently of disorder of the alimentary canal, I have seen aphthous vesicles take place in the mucous membrane of the lips and cheeks, and proceed to the formation of small superficial ulcers having the appearance of being formed by a portion of mucous membrane pinched out of the part. They always disappeared, however, or healed under the use of lotions of borax, alum, or sulphate of zinc.

ETIOLOGY.—The primary or idiopathic form of thrush is a disease chiefly incident, as I have already said, to infants at the breast, and it is more common soon after birth than subsequently, with the exception of the period of eruption of the milk teeth, at which time it is liable to ensue.

The disease is more common in foundling hospitals and other institutions for infants than in domestic life, and in these it often prevails like an epidemic. It is also more common in infants fed by the hand than by the breast; and it is often to be traced to the excessive or premature use of bread in the food of the infant. It is, on the other hand, observed, that it takes place in infants freely supplied with breast-milk, but the quality of which is injured by the improper or irregular diet of the nurse or mother. Of this change one of the marks is said to be premature coagulation, for instance in the mouth of the infant, and which indicates the presence of an acidulous principle. Besides the circumstances now referred to, the use of artificial nipples, sometimes not properly cleansed, the diseased nipple of the nurse, and suppressed perspiration, are regarded as exciting causes of aphthous eruptions.

Other circumstances which tend to give the disposition to

the disease are confined or impure air, such as that of foundling hospitals, and especially that of their sleeping chambers, neglect of cleansing and washing the persons and clothing of infants; a damp locality or a cold season. Thus Lentin states that, in the neighbourhood of Lunebourg, near the broadest river of lower Germany, the frequency of the disease was to be ascribed to the humidity of the atmosphere, and it is also certain that it is extremely common in the marshy districts of Zealand and Belgium.

Some have believed that infantile thrush is an infectious complaint. The chief circumstance favourable to this view is the simultaneous prevalence of the disease among many infants in the same hospital, or in the several apartments of the same building. But it may be observed that this circumstance admits of explanation as readily upon the hypothesis of epidemic or endemic, or atmospheric or local influence, as upon that of infectious origin and propagation. It is also said, however, that the use of the same spoon among different infants has been observed to induce the disease; and some have believed that cases of it might be traced to the filthy and disgusting practice of the nurse previously mumbling the food between her lips, and wetting it with saliva, when she gives it to the infant. It is easy to perceive that such a practice must be in many modes injurious to the infant.

On the pathological cause of the disease, different opinions have been entertained. Some, as Jahn, have imagined that it consists in atony of the muciparous glands. Hildenbrand seems to think that it consists in inflammation of the mucous membranes, which is more powerfully and particularly developed in the muciparous follicles, causing a morbid secretion of serous fluid, which raises the *epidermis* in vesicular spots.

PROGNOSIS.—Though aphthous vesicles may terminate, like other mucous inflammations, in the increased secretion of mucus or mucous matter, in some instances it presents a termination peculiar to itself, or at least the more intense forms of mucous inflammation. It may proceed to excoriation and superficial ulceration, or even to gangrene. When it does not take the latter course, and when the inflammatory process is energetic, plastic or albuminous secretion may take place and cover the whole interior surface of the mouth, tongue, fauces, and palate, with a lymphy incrustation, which afterwards is se-

pared and discloses the subjacent surface either healed or covered with recent epidermis, but which is very red, tender, and liable to undergo the same process. In the vagina the process may produce adhesion of the opposite walls of this canal.

The danger of secondary aphthous eruptions is altogether dependent on the primary disease. In some cases the appearance of *aphthæ* is a matter of indifference, or at least unimportant. But in chronic diarrhœa, dysentery, and pulmonary consumption, they are among the list of symptoms which denote the approach of the disease to its fatal termination.

TREATMENT.—The treatment of aphthous eruptions in infants is general and local.

In the management of the general symptoms, the first object is to correct the state of the digestive function, and the alimentary canal. For this purpose, as there are always symptoms of acidity, it is proper to administer prepared chalk, or rhubarb and magnesia, and to give afterwards doses of castor oil sufficient to expel the bad secretions, and the remains of undigested food. If the symptoms are not under this mode of treatment alleviated, it will be right to give an emetic before proceeding further, and then to exhibit antacids, and ecoprotic cathartics. The chalk mixture, alternated with manna or castor oil, will answer well, and even a dose of calomel and chalk may be advantageous in rectifying the hepatic and intestinal secretions, when the discharges are slimy or clay-coloured.

Among local applications, borax has long held the principal place, as a mild but effectual stimulating detergent; and a convenient form for its use is that of the honey (*mel boracis*,) which is both slightly demulcent, and not useless in the circumstance, that its viscosity prevents it from being soon removed after application. Alum and the sulphate of zinc I have also found useful; and in some cases it is desirable to employ a solution of nitrate of silver, applied over the aphthous surface by means of a camel hair pencil.

The difficulty of curing this disease in certain circumstances, and its frequency in particular situations and localities, renders it important to be aware of the means of prevention. These consist in scrupulous attention to cleanliness by sedulous and regular ablution, with care to keep the clothing of the infant clean and dry; attention to the food and drink, and

evacuations of the infant; attention to the mouth, by means of frequent washing, and to the alvine secretions by occasional medicine; attention to the air of the chamber, in which the infant or infants sleep and spend most of their time; and lastly, taking care that the clothes or other utensils employed by sickly infants shall not be used by the healthy.

B. Pharyngo-tracheo-bronchial Mucous Membrane.

I come now to consider a tribe or family of inflammations, which are seated in various regions of the mucous membrane, investing the air-passages from the throat or root of the tongue to the lungs. From the basis of the tongue, the mucous membrane is continued through the larynx, windpipe, and divisions of the bronchial tubes to the parts named cells of the lungs, and through all this extent it is liable to the ordinary phenomena of inflammation, which, however, are modified by the anatomical peculiarities of the parts. It is not certain that inflammation in this membrane is in other respects uniformly the same; and perhaps it may differ in kind as well as in the nature of the parts in which it is seated. In general it betrays a disposition to spread, but it would appear also to pass occasionally from the mucous surface to the subjacent cellular tissue. Inflammatory action may be developed at any part of the membrane, constituting thus a local inflammation; but it more usually affects a certain region of the membrane, and with definite symptoms forms a particular inflammatory disease. These forms of disease recorded by authors, to which the practical physician should direct his attention, may be all referred to the following general heads: 1. As the inflammatory action is developed in the throat or pharynx; 2. as it is developed in the larynx; 3. as it is developed in the windpipe and bronchial membrane; 4. As it is developed in the bronchial membrane without affection of the other two parts. These inflammations possess several common characters, and in this respect may be viewed as mutually allied, and particularly separated from other mucous inflammations. All of them are attended by some degree of impaired voice, injured or obstructed, or unusually quickened breathing; they are accompanied with more or less of the convulsive motions of sneezing or coughing; in the early part of their action, the living property of the membrane which they affect is diminished, afterwards it is *exalted* or augmented, and much changed, producing, instead of the ordinary secretion,

a fluid thicker, more opaque, or more viscid, in some instances like purulent matter, and not unfrequently tinged or streaked with blood. These local symptoms are accompanied with increased quickness of pulse, in some forms of this inflammation very much quickened, heat of skin, thirst, slightly furred tongue, irregular moisture, and dryness of the skin, scanty and high-coloured urine, and inquietude more or less considerable.

Besides the acute form of inflammation incident to these membranes, the physician has frequent occasion to observe one more or less chronic. The symptoms of this action are in general less violent and distinct than those with which the acute inflammations are attended;—and with greater mildness, they are more permanent, and more obstinate than in the acute forms. They are not, however, different in kind, and the observer will in general recognize the same train of the same morbid phenomena in the chronic or subacute, as the acute inflammations of these membranes.

§. VII. *Angina Diffusa ; Angina Gangrenosa.* Ulcerous Sore Throat; Malignant Sore Throat. Garrotillo of the Spaniards. *Diphtheritis pharyngea*, Bretonneau.

Joh. Antonia Foglia de faucium ulceribus. Neapoli, 1563. 4to.—Franc. Nola de epidemica phlegmone anginosa, grassante Neapoli. Venetiis, 1610, 4to.—Franz. Perez Casales de Morbo Garrotillo appellato, Madrit. 1611. 4to.—Joh. Alphons. de Fontecha de angina et Garrotillo puerorum. Complut. 1611. 4to.—Johan de Villareal de signis, causis, et curatione morbi suffocantis, L. ii. Compluti, 1611. 4to.—Christopher Perez de Herrera Tractatus de scientia, causis, praesagio, curatione faucium et gutturm anginosorum, &c. Madrit, 1615.—Ildefons Nunnez de gutturi ulceribus anginosis. Seville. 1615. 4to.—Johan. Carnevala de epidemico strangulatorio affectu, Neapoli, 1620. 4to.—J. Andr. Sgambati de pestilenti faucium adfectu Neapoli saeviente opusculum. Neapoli, 1620. 4to.—Tratados Breves de Algebra, y Garrotillo por el Licenciado Andres de Tamayo. En Valencia, 1621.—Thom. de Aguiar Apologia adversus Nunnez cum censuris in Librum de faucium ulceribus anginosis vulgo Garrotillo. Murcia, 1621. 4to.—Thomas Broncoli de populari horribili ac pestilenti gutturi et annexarum partium affectione, &c. Neapoli, 1622. 4to.—Marc. Anton. Alayma Discorso intorno alla preservazione del morbo contagioso e mortale che regna in Palermo. Palermo, 1625. 4to.—J. Domini Prosimi de faucium et gutturi anginosis et pestiferis ulceribus consultatio. Messana, 1633. 4to.—Aetii Cleti Signini de morbo strangulatorio Opus. Romae, 1636.—Tratado Breve de la Curacion del Garrotillo, por el Doctor Geronymo Gil y de Pina. En Zaragoza, 1636.—Schobinger, Dissertat. de morbo strangulatorio seu maligno faucium carbunculo. Basileae 1650.—J. Astruc, Lettre sur l'espece de mal de gorge gangreneux qui a regné par mi les enfans, l'année 1748. Paris, 1748. 4to.—Martini Ghisi, Lettere Mediche, ii. Cremona 1749.—Chomel sur l'espece de mal de gorge gangreneux, &c. Paris, 1749.—Account of the Sore Throat, &c. By John Fothergill. London, 1751.—An Account of the *Morbus Strangulatorius*, communicated in a Letter from John Starr, M. D. to C. Mortimer, M. D. Read May 24, 1750.—Philosoph. Trans. xlv. London, 1752.—Langhans Beschreibung verschiedener Merk-

wurdigkeiten des Simmenthals nebst einem Bericht uber eine neue ansteckende Krankheit. Zurich, 1753.—Navier, *Dissert. sur plusieurs maladies populaires, &c.* Paris, 1753.—A *Dissertation on the Malignant Ulcerous Sore Throat.* apud *An Essay on Fevers*, 3d edit. By John Huxham, M. D., &c. London, 1757.—Penrose, *Dissertation on the Inflammatory Gangrenous and putrid Sore Throat.* Oxford, 1766.—Fr. Lallemand, *Febris Malignæ Topicæ angina gangrenosa vocatæ historia.* Argentorati 1766.—Marteau de Grandvilliers *Description des Maux de Gorge epidemiques et Gangreneux.*—A Aumale. Paris, 1768.—Extract of a Letter from Cadwallader Colden, Esq. to Dr Fothergill, concerning the Throat Distemper. Read Dec. 24 1753, *Med. Observations and Inquiries*, Vol. i. London, 1771.—Inquiry into the Angina Suffocativa, by Samuel Bard. New York, 1771.—Georg. Brugnioni *Storia della squinancia cancerosa epidemica e contagiosa.* Torino, 1777.—Read *Histoire de l'Esquinancie gangreneux petechiale dans la village de Moivron, &c.* Paris, 1777.—James Johnstone on the Malignant Angina, &c. Worcester, 1779.—*Medical Tracts* by John Wall, M. D. Oxford, 1780. P. 58.—Goldhagen, *Dissert. de Anginæ Gangrenosæ differentiis.* Halae, 1783.—Doering i. p. 122. G. Levison *Beschreibung der Epidemischen Bräune nebst ihrer Heilungsart.* Berlin, 1783.—Aloys Suares Barbosa de Angina ulcerosa. Lissabon, 1789.—Dangers, *Dissert. in anginae malignae aetiology eique convenientem medendi methodum inquirens.* Goetting, 1792.—Remarks on the Angina and Scarlet Fever of 1778. By James Johnstone, M. D. Worcester. *Memoirs of Medical Society*, Vol. iii. p. 355. London, 1792.—*Dissertation on the Putrid Ulcerous Sore Throat.* Philadelphia, 1793.—Practical Information on the Malignant Scarlet Fever and Sore Throat, by E. Peart. London, 1802.—Des Inflammations speciales du tissu Muqueux et en Particulier de la Diphtherite, ou Inflammation Pelliculaire connue sous le nom de Croup, d'Angine Maligne, d'Angine Gangreneux, &c. Par P. Bretonneau, Medecin en chef de l'Hopital de Tours. A Paris, 1826.

About the beginning of the seventeenth century various Spanish physicians, as Casale, De Fontecha, Villareal, De Herrera, Nunnez, De Aguiar, and Tamayo, and several Italian physicians, as Nola, Carnevale, Broncoli, Sgambati, Alayma, Prosimi, and Aetius Cletus, described a disease of the throat, which prevailed chiefly among children, and was distinguished for proceeding rapidly to the fatal termination. The symptoms were very generally attributed to ulcerative and gangrenous inflammation, in consequence of the appearance of whitish or gray specks on the palate and tonsils, the fetid smell issuing from the throat, and the rapidity with which the distemper appeared to enfeeble the strength and impair the powers of life.

In the middle of the eighteenth century, Dr Fothergill showed that this disease was allied to, if not the same with, scarlet Fever; a view which has been very generally if not universally adopted; and not long after, its epidemic prevalence in various towns and villages in Cornwall, and the West of Devonshire, led Dr Starr and Dr Huxham to describe the disorder with particular attention. The subsequent history of the disease, while it has partly confirmed the views of Drs

Fothergill, Johnstone, and Sims, regarding the connection with scarlet fever, has also shown that, in certain circumstances, the affection of the throat may exist separately and independently of the eruption on the skin, and that, whatever view be held of this connection, it is important to have a correct understanding of the disease of the mucous membrane of the throat.

The history of the disease presents several difficult points for consideration. It must be allowed that the disorder described by the Spanish and Italian physicians above-mentioned is quite the same as that afterwards described by Fothergill and Huxham; and though the inference be not free from difficulties, it is nevertheless very nearly equally certain, that Starr and Huxham witnessed the same disease. The principal difficulty consists in this, that Starr describes as often, if not always, formed in this distemper, a membranous crust covering the fauces, and occasionally descending into the windpipe; and indeed he delineates a tubular membrane, which was in one case ejected from that tube, where it had been moulded on the interior surface of the canal, which bears a close resemblance to the membrane of croup, and which led Cullen and others to doubt, whether the disease, in which this membrane was formed, belonged to the head of malignant *Angina*, or to that of croup. (*Angina membranacea*, or *trachealis*.)

It is chiefly this circumstance with the contemporaneous evidence afforded by the writings of Martin Ghisi, and his own experience, that several years ago, (1826,) led M. Bretonneau to conclude that the ulcerous and gangrenous sore throat or malignant *angina*, and croup, were mere varieties of the same distemper, and that the form of throat affection called gangrenous is really not gangrenous.

The latter conclusion seems to be perfectly well founded, in so far as the opaque tenacious crusts formed on the mucous membrane of the throat, which had been regarded as sloughs of that membrane, were in truth morbid secretions from it in a state of inflammation, and the formation of which could be checked only by allaying that action.

The other conclusion, that the *angina* or diffuse inflammation of the mucous membrane of the throat, is a mere variety of croup, and that the latter is the ultimate degree only of the former disease, though plausible, is liable to several objections, which will appear more clearly when I come to con-

sider the history and pathology of that disorder. It may be sufficient here to observe, that even the similarity of morbid product, if always established, would not be a sufficient reason for regarding a disease of the mucous membrane of the throat as quite the same with one in the windpipe and bronchial tubes, which we know croup to be.

The character of the ulcerous sore throat, or the diphtheral inflammation of the throat, is that of a diffuse or spreading action, which commencing in the posterior nasal and palatine cavities, quickly spreads forward through the surface of the nasal and lacrymal mucous membrane, and backwards over that of the *fauces*, *uvula*, tonsils, and *pharynx*, without any tendency to penetrate its substance, or to the submucous tissue. It must not be denied, nevertheless, that the subjacent and adjoining glands, as the tonsils, the sublingual and submaxillary, and even the lymphatic glands, are sometimes slightly enlarged and painful. But this is more frequently an accidental complication than an essential part of the disease.

The disease consists in extreme redness, rawness, and soreness of the membrane, with secretion at first of thin acrid fluid, and afterwards the speedy formation of a newly secreted product, which soon becomes converted into whitish or gray, opaque, tenacious, and firm specks and patches, which cover the inflamed membrane. The formation of this coagulating product by the membrane is a provision for its defence from the contact of foreign bodies while inflamed, and to enable the healing process to advance without interruption. The natural tendency of the patches is to adhere until this process is completed, and the membrane quite healed, upon which they drop off spontaneously and without force. But, if they be forcibly removed during the intensity of the disease, and before the inflammatory action has subsided, in short, while the membrane is still red, raw, and vascular, the exposure in that condition to air and the contact of foreign bodies aggravates and protracts the inflammation; and the result is a new secretion of the same matter, which undergoes the same process, and remains adherent to the surface of the inflamed membrane, until the inflammatory action is abated and declines. In some instances in which the membranous covering is thus forcibly detached, the inflammatory process is so much aggravated as to produce ulceration in the exposed surface. This,

however, does not seem to be a necessary and essential part of the disorder, and is the result only of the premature and forcible expulsion of the tenacious incrustation.

It has been further imagined that this disease was of a gangrenous character, because the white opaque incrustation with which the mucous membrane of the throat was observed to be covered was believed to be a slough or mortified part of the mucous covering. This, however, is evidently a mistake, since, if carefully observed during life, and examined after death, it is always found to be a new product, the result of the inflammatory action, and the membrane may be observed free from injury, and only red, raw and highly vascular beneath it, but void of the usual characters of a surface affected by gangrenous inflammation. There is indeed nothing pathologically impossible in the inflamed surface becoming mortified, especially if the incrustation be prematurely and forcibly detached, so as to aggravate the violence of the inflammation in the subjacent membrane. But this is rather an accidental result of detachment, than an essential and constituent part of the disease.

The character of the constitutional symptoms, by which this distemper is attended, varies in different individuals and in different epidemics. In general the face is flushed, though sometimes pale and bloated; the eyes are more or less injected, heavy and watery or turbid; the skin is dry; the patient complains of thirst; and the pulse is quick and small, fluttering and oppressed, or undulating and variable in point of strength. The disease not unfrequently is introduced by sickness or vomiting, but there is always a loss of appetite approaching to *anorexia*, and the bowels are bound. The urine is in general pale, thin, and void of sediment; in other instances it is high-coloured and turbid like whey or milk and water.

The general strength is always more or less, sometimes considerably impaired; the patient is listless and indifferent to external impressions; and, without any positive complaint, he seems oppressed with great and unaccountable languor both of mind and body. In some cases, on the other hand, the patient possesses sufficient strength to walk about his chamber; and instances are recorded in which this has been done a few hours before death.

It is also important to observe, that these symptoms are not at all times of the twenty-four hours the same. The patient often presents no remarkable indications of disorder, except

those of general weakness during the day; but in the evening and during the night a considerable and evident exacerbation takes place. The surface becomes hot; the face flushed, and the eyes still more injected and turbid than during the day; the pulse becomes quick, and sometimes hard, full, and throbbing; the patient is restless and cannot sleep; and very often there is delirium and even *typhomania*.

The local symptoms are more or less, sometimes considerable uneasiness in the throat, often with a sense of rawness in it; difficult deglutition; sneezing, with discharge of acrid fluid from the nostrils; oppression and anxiety in breathing; with a fetid putrid smell of the breath, and short tickling cough, and desire, but with great inability, to expectorate. As the disease advances, this symptom increases in violence, and with increased rapidity and panting in the breathing, a rattling noise in the throat comes on, exactly similar to the noise made in strangulation by a cord, and death takes place by suffocation. From the characteristic nature of the latter symptom, this disease received among the Spaniards the popular name of *Garrotillo*,* and was known among physicians by the epithet of *morbus strangulatorius*.

PROGNOSIS.—The duration of the disease varies in the most acute form, from three to five or six days; but in others it may be protracted to the eleventh or twelfth. In violent and intense cases, death may take place in three days either by *asphyxia*, or *coma*, or by both combined. In many of the cases seen by the Spanish physicians, in infants, death took place on the first day. In others less severe at the end of the third or fourth, or at most on the fifth or sixth day, the local symptoms undergo a slight abatement, and in the course of three days more the general symptoms also begin to decline. The favourable symptoms are, abatement in the injection and watery turbidity of the eyes, and their gradual recovery of the usual clearness, the respiration being free from oppression and labour, and becoming less rapid, the fall of the pulse from 120 to 90 or 80, with proportional freedom from oppression and increase in the fulness and largeness of the beat, the tongue becoming clean and the skin moist, and the urine depositing a copious sediment. Expectoration of the incrustated portions generally accompanies or follows these symptoms of amelioration.

The unfavourable symptoms are occasional, frequent, or con-

* “Como si les ahogaran con un garrote.”—Gil y de Pina.

stant delirium and restlessness; rapid and laborious respiration; quickness, smallness, and oppression of the pulse; weakness and nasal tone of the voice; difficulty in deglutition; the membrane of the throat, when the crusts are separating, being of a fiery red-colour or becoming black; diarrhœa, and great feebleness in the muscles of voluntary motion.

Though in general, if the patient survives the fifth and sixth days without the supervention of bad or unfavourable symptoms, there is reason to presume that the disease will terminate favourably, yet it is always difficult to determine the prognosis with accuracy. Death may take place even so late as the fourteenth or fifteenth day, and even later. (Colden, &c.)

MORBID ANATOMY.—Inspection in fatal cases shows the mucous membrane of the *velum*, *uvula*, tonsils, and *pharynx* to be of a bright red-colour in points, rough, raw, and somewhat soft,—covered more or less completely with an incrustation of opaque, yellowish-white, or ash-coloured tenacious matter. The palatine and pharyngeal membrane is seen below quite free from ulceration, erosion or even thickening of its substance. In some cases, this new product is observed passing into the windpipe, more frequently into the œsophagus. (Bretonneau, 34, 35.) No appearance of mortification is recognized.

The lungs are generally sound. Any other morbid states of other organs are independent of those now remarked in the throat.

ETIOLOGY.—The causes of this disorder are imperfectly known. It has almost always prevailed among many individuals in a community at the time at which it has appeared, and has consequently been very generally imagined to be propagated from one to another by infection. This however seems inconsistent with the fact, that it has almost invariably been found to prevail most in particular localities in certain seasons, and after certain kinds of weather. Thus it has been more prevalent in towns near the sea coast, and damp humid localities, than in inland situations, and more frequently in damp than in dry seasons. Though it may attack persons of all ages, yet the young of both sexes are more liable to it, than those in adult or advanced age. The contagious character of the disease, though believed by Nola, Carnevale, Alayma, and most of the physicians of the seventeenth century, is, however, almost incapable of being proved, and perhaps it is equally difficult to be disproved. Bretonneau gives rather a contradic-

tory opinion being in one part of his work neutral, and in another (309) rather confident in its contagious character. He allows, however, that it is only under certain conditions that it appears to spread from one person to another.

TREATMENT.—A good deal of difference of opinion has been entertained upon the proper mode of treating this distemper. Those who ascribed to it a gangrenous character recommended alexipharmics and tonics, and condemned all evacuations, as highly pernicious; and after great mortality had been observed to take place under the antiphlogistic and partially antiphlogistic method, it was believed to be a great improvement, when Dr Fothergill and Dr Wall recommended the active administration of Peruvian bark, as frequently and in as great doses as the stomach of the patient could endure. The variable success which subsequently attended the use of this agent has, however, shown either that it is not uniformly efficacious, or that different epidemics present different characters, and require corresponding modifications in treatment.

The simplest and most effectual mode of treatment appears, from all considerations, to be the following.

At the first indications of the appearance of the disease, an emetic, consisting of fifteen or twenty grains of ipecacuan, and half a grain or one grain of tartrate of antimony, should be administered, and it will be proper afterwards to employ nauseating doses, either of ipecacuan or tartrate of antimony, according to their effects and the intensity of the symptoms. If the antimony threatens to purge, the liquor of acetate of ammonia may be substituted.

In the *second* place, the bowels must be freely and efficiently evacuated by means of calomel and colocynth, or jalap, succeeded by castor oil, or the saline infusion of senna. This should be repeated every alternate day, or daily, according to the state of the secretions and the symptoms. It is also advantageous to give tamarind water, or stewed prunes, with the same intention.

Thirdly, it is highly important to employ revellents, as sinapisms and blisters, to the external surface of the throat. In some instances, in which external swelling and pain are considerable, leeches should be applied below the angles of the jaw on each side.

Fourthly, local applications are in this disease of great mo-

ment. They may be applied in the form of vapour or in that of lotion.

In the first case the patient should inhale the vapour of hot water impregnated with vinegar, hydrochloric acid, or chlorine, which is believed to be the most efficient agent in checking the progress and abating the violence of the inflammation. The strength of the latter of these agents must be regulated by its effects on the respiration of the patient.

In the second form, or that of topical application, two modes of administering the remedy are in use. The one by gargle is applicable chiefly to adults, and is often even with them inefficient, in so far as the lotion used does not reach all the seats of the disease. The other, by means of a hair pencil, or brush, is by far the best, is indispensably requisite in the case of children, and in that of adults is often highly serviceable. The substances employed in this manner are solutions of alum or sulphate of copper, nitrous acid, hydrochloric acid, either pure or diluted, water impregnated with chlorine, strong solutions of nitrate of silver, or that substance applied in the solid form.

Gil y de Pina states that the Spanish physicians used *aqua-fortis* or nitrous acid, diluted with rose water or plantain water.

The hydrochloric acid has been very strongly recommended by Bretonneau, either in the pure form, or mixed with three parts of honey. The former he regards as the most efficient, and he justly remarks, that it is better to apply this agent once and efficiently in the course of twenty-four hours, than in the same space of time to have recourse to several applications of the diluted acid.

Chlorine water is also a very powerful remedy, and may be used in the same manner as the hydrochloric acid.

When nitrate of silver is used, a solution consisting of ten grains to the ounce should be applied very freely over the whole inflamed membrane. It is the best and most generally admissible application.

M. Bretonneau believes that these agents produce their beneficial effects, by inducing another form of inflammation, which arrests the progress of the specific form affecting the mucous membrane.

This may be well founded. But it seems more natural to think, that the agents now specified operate principally in changing the action of the membrane, in stopping the disposi-

tion to secrete coagulable matter, and in keeping the crusts applied till the surface is thoroughly free from redness and rawness, and they are thereby enabled to drop off spontaneously.

Calomel has been supposed, both generally and locally, to exert a specific influence in the cure of this disorder. Several facts, however, show that locally it is of no use, and that generally it may be injurious, and that beyond its cathartic effect little benefit can be expected from it.

§. VIII. Croup ; Choak ; Stuffing ; Rising of the Lights ; Hives. *Suffocatio stridula*, Home. *Angina Trachealis* ; *A. Membranacea* ; *A. Polyposa*, Michaelis. *Cynanche Trachealis*, Sauvages and Cullen. *Morbus strangulatorius*, Starr ? *Angina suffocans*, Bard. *Tracheitis*, Albers and Hildenbrand. *Diphtheritis trachealis*, Bretonneau. Die Hautige Bräune; das Hühnerweh; Die Stickbraune, Germ. *Strypsinscha*, Swedish. *Hartyas Torokgyez* vel *Leveyotsopip* vel *Pip*, Hungarian.

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There is reason to believe that this disease was long confounded with other affections of the throat and breast resulting from exposure to cold. Though certainly described by Martin Ghisi in 1749 at Cremona, and perhaps by Starr in Cornwall in 1753, it is generally understood that Dr Francis Home of this city gave the first distinct account of it in 1765, as it was observed in Leith, Musselburgh, and the vicinity of the city. Since that time it has been the subject of inquiry to many authors, both in this country and on the continent. Though we agree with Cheyne in doubting whether Millar or Rush really alluded to Genuine Croup in the works which they published in 1769 and 1770, it must be admitted that Field and Rumsey saw and treated cases of the disease.

Michaelis was supposed to have given the best account among foreign physicians, till the treatises of Jurine and Albers obtained the Napoleon prize in 1812. At the same time, Double, Vieusseux, and Caillou, who were unsuccessful com-

petitors, published memoirs ; and Royer-Collard, who was appointed by the commission to report on the different essays, inserted a dissertation on the disease in the seventh volume of the Dictionary of Medical Sciences. To pass over others of less note, it may be said that none of them is superior to the work of Cheyne, in which the author minutely describes the disease as he observed it in Leith and the vicinity for several years, and illustrates its pathology by good dissections. Since the period now referred to, scarcely any disease has formed the subject of so many essays, memoirs, and monographs ; and I must only mention in chronological order, several of the leading treatises on the subject, without adverting to the numerous dissertations and essays in periodical works, which have appeared during that period.

Croup may come on in two different modes. It may commence gradually with the usual symptoms of incipient catarrh, namely, *coryza*, pain and weight of the head, hoarseness, cough, and slight fever aggravated in the evening. Children lose their wonted cheerfulness and playfulness, and become languid, peevish, and fretful, and are uniformly much hotter than ordinary, and do not sleep. To these symptoms is generally added more or less pain or tightness in the throat, and towards the breast ; and in general, even at this period, a careful observer may recognize unusual heaving in the chest, and the respiration becoming more frequent than natural.

In the course of a day or two, the cough, which was at first only occasional, becomes more frequent and severe, and is attended with a peculiar hoarse, sharp, and as it were, barking tone. Deglutition remains little affected ; but the respiration becomes more difficult and laborious, and is attended with occasional feelings of anxiety, which cause the infant frequently to start from sleep and point with moaning to the throat and breast. In some instances, it is said, that swelling takes place on both sides of the larynx, and in many the hands and feet are swelled. The tongue and tonsils are covered with viscid opaque mucus ; the face is red and swelled, or slightly bloated with a reddish shade ; the eyes are reddish and wild ; the anguish and oppression of the chest are remarkably aggravated, while the patient rises or sits, and are alleviated in the horizontal position ; the skin is hot and dry ; and the pulse quick and tense, but often small and oppressed.

At the same time the voice becomes stridulous and acute, like the crowing of a fowl; in some instances, hoarse and clanging, like the screaming of a pig, or the barking of a dog. The breathing becomes more rapid, with difficulty in inspiration, which is performed with a whizzing stridulous noise; while expiration, either in speaking or coughing, is performed with a shrill ringing sound, as if the noise came through a brazen tube. The eyes are watery, staring, and prominent; the expression is wild and anxious; the frontal and jugular veins are distended; and the face begins to be livid at the nose and lips, and even slightly on the cheeks. The pain in the throat, which was at first slight and dull, is now increased, and is aggravated by pressure and motion of the head. At the same time the heart beats violently and rapidly, at the rate of from 120 to 140 or 160 in the minute.

In the second mode of attack the patient is seized after some slight cough and uneasiness in the chest, with rapid, panting, laborious breathing, sibilous inspiration, and hoarse clanging expiration, speedily followed by the symptoms of anxiety, restlessness and threatening suffocation.

As the disease continues, the symptoms of difficult, rapid, oppressive, and anxious respiration become more intense and urgent; the pulse becomes so quick as scarcely to be counted; the skin continues hot and dry; and the child is restless, with incessant jactitation. Either with or without efforts to vomit, and coughing or hawking, the contents of the stomach are ejected, and filamentous or membranous shreds, sometimes with fluid or semifluid purulent matter, are excreted from the windpipe. In some instances these membranous shreds are amorphous, but flat; in others they are tubular or cylindrical, and more or less ramiform. They may be firm and tenacious, or soft, loose, and pulpy. They may be whitish, or yellowish gray, or reddish, or streaked with blood; but they never present traces of organization.

The ejection of these membranes and shreds is generally attended with transitory relief. But very soon all the symptoms of anxiety and laborious respiration recur with increased urgency. The chest heaves incessantly; the larynx is elevated by each inspiration; and all the muscles are thrown into violent and excessive action, with distension of the jugular veins at each motion. The countenance becomes livid, the

eyes staring and injected, the power to cough and expectorate ceases, and after some ineffectual struggles, with bronchial rattling in the chest, death takes place by asphyxia. In some instances slight *coma* attends.

The duration of the disease is generally short and its course rapid. Death may take place on the second day; and beyond the eleventh it is never protracted, as either the fatal or favourable issue takes place before that time. In some cases, it is said, the symptoms after continuing several days, appear to be alleviated. The breathing becomes freer; appetite for food returns; the child amuses himself, and seems to have forgotten his sufferings. Yet this relief is too often temporary. The breathing is suddenly obstructed; the face becomes dark red or purple and swollen; and life is terminated by convulsion.

Croup may terminate favourably in various ways. *First*, After the symptoms have attained a considerable height, they gradually recede. The pulse becomes fuller and softer, generally less frequent, though this is not so conspicuous; the skin becomes moist; the cough loose, and the breathing easy, and the voice gradually recovers its natural tone. *Secondly*, After the disease has continued a few days, a white viscid tubular substance, of the consistence of membrane, and hence termed the membrane of croup, is expectorated, and the child is relieved. The discharge of this substance, however, produces in general mere remission of the symptoms, and does not affect the course of the disease. *Thirdly*, Croup may be a more chronic affection, and not subside for several weeks, when the resolution is gradual; the child expectorating puriform mucus freely, and now and then membranous films.

The duration of croup varies according to the severity of the disease. Patients have been said to die within twenty-four or thirty-six hours from the accession of the symptoms; but Rumsey is inclined to think that in such instances the commencement of the disease had been carelessly marked. Cheyne states the third day as the earliest, and Rumsey says it may in its more severe form go on to the fourth or fifth, or even later. After this period, when membranous films are spit up, which is generally the result, life may be protracted to the tenth day; the symptoms being relieved after each expectoration; but becoming aggravated when another film is about to be discharged. After this period, either the disease subsides entirely, or assumes the chronic form.

The appearances on dissection vary according to the duration of the disease. When death takes place after an illness of four or five days, the windpipe is found to be lined with a white or gray substance, sometimes, if considerable, varying in thickness and density. It arises either at the thyroid cartilage, or a little below, and is prolonged down the windpipe into its divisions. It is never found lining the membrane which covers the laryngeal cartilages; and immediately below them, where it commences, it is thin, soft, and not tenacious; at the middle of the tube it is firm and more dense; and at the lower part of the windpipe, and in the bronchial tubes, it is loose, soft, filamentous and semifluid. A quantity of opaque white fluid, like purulent matter, is generally found working up from the bronchial tubes; and if cut open, in many instances they contain this in considerable quantity. The inner surface of the windpipe, which is covered by the membranous crust, is red, and presents bloodshot patches; and in general similar appearances are recognized along the mucous surface of the bronchial tubes; in some instances through its whole course. A watery or serous fluid appears to fill the cells of the pulmonary filamentous tissue; and the lungs are more solid and firm than in the healthy state, and do not collapse so much as usual when the chest is opened. The pulmonary pleura may be redder and more vascular than natural, or with the pericardium may contain serous fluid; and the cavities of the heart are unusually full of blood.

In other instances the inner or mucous membrane of the windpipe is merely reddened and swelled, and patches or shreds of white viscid matter are found only in certain spots.

The knowledge of these appearances explains the nature of the morbid action called Croup. It cannot be doubted that the membranous substance or viscid crust which lines the surface of the windpipe is a morbid exudation which results from inflammation of the tracheo-bronchial mucous membrane. It was at first imagined that it was the cause of croup, or, to speak more to the fact, the cause of the symptoms to which the name of croup was given. The phenomena of the disease and the result of dissection show, that it is the effect of the morbid action in which croup consists. We have already seen, that the formation of the tubular membrane is not constant; and Cheyne has related one case in which it was not found, but was merely be-

ginning to be formed. In other instances children have been cut off early in the disease without any trace of this exudation ; but then the tracheal and especially the bronchial mucous membrane was reddened and swollen, and puriform fluid was found in the bronchial tubes.

The nature of this morbid exudation, especially of the tubular membrane, was formerly a matter of dispute. It was believed by Home to consist of morbid mucus thickened. Cheyne regards it as consisting of a puriform fluid, similar to that formed by the *pleura* or *peritoneum* when inflamed, and thinks that it is of the same nature with the fluid secreted in the breath-tubes, as the fluids are similar in colour, and the surface is continuous. " We can even demonstrate the adventitious membrane degenerating into the puriform fluid, and again gaining consistence in different parts of the same membrane. There is sufficient evidence in the difference between their sensible and chemical qualities, that the membrane of croup is not inspissated mucus. The fluid which composes it wants the resiliency of mucus. It bears maceration without destruction of its structure." In this, however, there is some inconsistency. The inner surface of the windpipe and breath-tubes, though unlike the inner surface of the gastro-enteric mucous membrane, is not quite similar either to the *pleura* or *peritoneum* ; and perhaps the morbid exudation is neither to be entirely regarded as thickened mucus, as Home imagined, nor as coagulable lymph, as Rumsey thought, or puriform fluid thickened, as Cheyne with some confusion has asserted.

Home remarks that the tubular membrane when completely formed was tough and thick, might be soaked in warm water for many days without dissolving ; that it did not adhere to the windpipe, as there was always fluid matter behind it ; and that where it ends, the windpipe and generally the bronchial tubes and pulmonary vesicles were covered with good *pus* or purulent *mucus*. Field regarded it as coagulable lymph. In one of his cases Rumsey calls it viscid *mucus* or phlegm ; in others, he says it resembled the buffy coat of the blood. The chemical properties of the tubular concretion were examined by Schwilgué, Maunoir and Peschier, and Jurine ; and it appears that the general result is that it contains albumen in various proportion, and that to this principle it owes its tenacity and firmness. It is most consistent, therefore, with the usual

processes of disease to conclude, that this substance, without being either wholly coagulable lymph, or thickened mucus, or the dried part of purulent matter, is a morbid substance secreted from the inner surface of the windpipe in a semifluid form like puriform matter, but undergoing a species of thickening or coagulation in consequence of albuminous matter in a peculiar state.

The facts above stated further show that the immediate agent of this morbid secretion is an inflamed state of the mucous membrane of the windpipe. Home observed that this membrane was redder than natural when the concrete covering was detached. Rumsey observed manifest traces of inflammation; in Cheyne's cases (p. 9,) the vessels of this membrane were large, distinct, and sometimes numerous. In short, whether the membranous exudation is present or absent, the mucous surface of the windpipe is always more or less inflamed; red, bloodshot, villous, and swollen.

The extent of the inflammation is the most interesting and practically useful part of the pathology of the disease. There is no doubt that it is chiefly the inner surface of the windpipe, but the point is what are the ordinary limits of the inflammation? Home has remarked that "the place first and most particularly affected is the upper part of the *trachea*, about an inch below the *glottis*, for in that part they complain of a dull pain; the external swelling has been observed there, and the morbid membrane we have found stretching from that place downwards. The back part of the *trachea*, where there are no cartilages, seems from the inspection of those that die of the disease, to be its first and principal seat: as this morbid membrane is often found there when it is in no other part." This has been on the whole confirmed by subsequent observation. The inflammation of croup has been found to commence chiefly in the windpipe, immediately below the cricoid cartilage, and to extend along the tube into the breath-tubes and the bronchial membrane. It is rarely observed to affect the laryngeal membrane, when the ordinary symptoms of croup above enumerated are present. In none of the cases of Cheyne was membranous exudation observed in the laryngeal mucous membrane, and if the inflammation extended to this part it was only slight, and its effects were seen in a little puriform fluid in the membrane of the cricoid or thyroid car-

tilages. In the eleventh case indeed, the epiglottis was slightly swelled, red, and vascular, the membrane covering the thyroid cartilages was red and swelled, irregular exudation was found within the cartilages, while little inflammation was found lower in the trachea. But this is to be regarded as an instance of laryngeal inflammation (*Laryngia*, *Cynanche Laryngea*) in a child, and not a proper specimen of true croup. The inflammation in croup is indeed truly tracheal and bronchial, and is always extended more or less into the breath-tubes (*bronchia*). Cheyne, in his first edition, admits that he did not examine this part of the breathing apparatus so minutely as he afterwards did; and states that he was convinced, by comparing it after croup and peripneumony, that the bronchial membrane is inflamed in nineteen of twenty cases of the former disease when fatal; and that were the affection limited to the larynx, the most formidable symptoms would never appear, (p. 118). It appears, in short, that croup consists in inflammation of the mucous membrane of the windpipe (*trachea*) and breath-tubes (*bronchia*), the tendency of which is to produce effusion of a puriform fluid, which, by thickening and hardening in the upper and larger air-tubes, is formed into an accurate mould of their figure and capacity; whereas in the lower and smaller canals it remains fluid or semifluid, and if not expectorated or absorbed, produces death by excluding the air from the lungs, or preventing its access to the bronchial membrane.* It is prevented from terminating in complete or perfect suppuration, by the rapidity with which the functions of the lungs are interrupted.

Most authors have remarked, that a very constant and distressing symptom of this disease is a spasmodic action, which they have referred to the *glottis*. It is probable that the presence of an abundant secretion in the bronchial tubes is sufficient to explain this phenomena without supposing a direct affection of the membrane or muscles of the glottis. I believe, at all events, that, if it does occur in croup, it is decidedly different from that which is observed in inflammation of the larynx (*Laryngitis*), where the obstruction is permanent, or uniformly augmenting in the glottis. It may be doubted whether this symptom has not been added to those of croup on inaccurate observation.

* Cheyne, Pathology of the Larynx and Bronchia, Section iv. p. 41, 42, 44.

The fatal termination of this disease has been ascribed by some to suffocation occasioned by spasm of the glottis. That this is never the case in true croup, I believe, for the following reasons. 1st, Many cases of croup evidently terminate fatally without any spasm of this part of the larynx; 2d, The most satisfactory dissections performed in unequivocal cases of the disease, have shown that the calibre of the larynx and glottis was not diminished; that there was room for the transmission of air within the tubular exudation at the upper part of the windpipe; but that the small breath-tubes or bronchial divisions were filled with viscid semifluid matter effused abundantly from all parts of the mucous membrane, which prevented the access of air, and thus occasioned suffocation. (Cheyne, Sect. iv.) 3d, The affection of the *glottis*, whether it consist in spasmodic contraction, or rather more correctly in mechanical diminution of its aperture, belongs to another disease (*Laryngitis*,) and indicates that the patient expires not so much under croup, as under inflammation of the larynx. It is not impossible that both may co-exist in the same individual; but this does not prove the statement now made of the pathological cause of death, to be erroneous.

If these observations be just, it is unnecessary to say any thing of the spasmodic croup mentioned by many authors; as it is either to be esteemed a mere symptomatic effect of the obstruction of the bronchial canals, or as a disease quite different from true croup. From the cases which I have witnessed of this disease, and from the facts adduced by Dr Marsh and Mr Fletcher of Gloucester, on spasm of the *glottis*, and above all by Dr Ley in his recent work on the crowing expiration of infants (*Laryngismus Stridulus*,) I think it just to infer, that this is a nervous affection depending on some cause irritating the eighth pair, and subverting the exact antagonism, by which the *glottis* is automatically and involuntarily kept open, and consequently allowing its margins to collapse and give rise to the form of inspiration so similar to that of croup.

ETIOLOGY.—Infancy and early life powerfully predispose to attacks of croup; but all periods of early life are not in this respect the same. Among 189 cases collected by Sachse, the proportion at the different ages was the following. From birth to the completion of the first year, 16; from the first year to the second, 45; from the second to the third, 35; from the

third to the fourth, 31 ; from the fourth to the fifth, 27 ; from the fifth to the sixth, 17 ; from the sixth to the seventh, 18. Among 91 cases referred to by Jurine, only one was above the tenth year. Among 92 cases, Haase found the respective number at different ages to be as follows ; 3 infants within twelve months ; 8 girls and 9 boys from the first to the second year ; 5 girls and 3 boys of two years ; 2 girls and 4 boys of three years ; 10 girls and 6 boys of four years ; 6 girls and 7 boys of five ; 3 girls and 5 boys of 6 ; 3 girls and 3 boys of 7 ; 2 girls and 1 boy of eight ; 1 girl of nine ; 1 girl and 2 boys of 10 ; 2 boys of eleven ; 1 boy of thirteen ; 2 of fourteen ; 1 youth of eighteen ; a girl of nineteen ; 1 man of twenty-one ; 1 woman of twenty-five ; 1 man of sixty, and 1 of sixty-eight. Among 39 cases seen by Joseph Frank, the following were the numbers of 32 at the different ages ; from birth to the close of the first year, 2 ; from the first to the second, 8 ; from the second to the third, 4 ; from the third to the fourth, 7 ; from the fourth to the fifth, 2 ; from the fifth to the sixth, 4 ; from the sixth to the seventh, 5. From these facts it results, that the disease is most frequent between the first and the seventh year ; more rare between the seventh and the fourteenth, and very rare between the fourteenth and twenty-first years.

The disease has been observed by Starr, Sachse, and Nobleville, at the age of eleven ; at twelve by Struve, Crawford, and Albers ; at thirteen by Rumsey, Sachse, and Joseph Frank ; at fourteen by Michaelis, Bayley, Maerker, and Sachse ; at fifteen by J. Frank ; at sixteen by Thilenius and Frank ; at eighteen, by Stoll, Sachse, and Frank ; at nineteen, by Portal and Thilenius ; and at twenty-one, by Keir. It is therefore a mistake to imagine that the disease does not attack adults. At the same time, it must be admitted, that it is impossible to be assured that all the cases represented to be croup were really instances of that disease. Is it not more likely that they were cases of laryngeal inflammation ?

Dentition has been believed to act as a predisponent cause. But perhaps the most powerful is the catarrhal disposition, or the tendency to affection of the mucous surfaces, which seems, in certain families and individuals, to be hereditary.

Other circumstances favourable to the production of the disease are the winter, spring, or autumnal seasons ; situations near the sea, especially if low and damp, or near large masses

of water, as lakes in the interior of countries, or by the banks or outlets of considerable rivers; and lastly, epidemical trains of weather, and a damp cold state of the atmosphere.

The exciting causes are cold applied in any form to the person, great efforts of the voice, as in crying, singing, &c. exposure to night air, the prevalence of the north or north-east wind, and various diseases, as measles, scarlet fever, small-pox, and erysipelas.

DIAGNOSIS.—Croup should be distinguished, on the one hand, from catarrh, from hooping-cough, and bronchial polypus; and, on the other, from *tonsillitis*, *laryngitis*, with which, there is reason to believe, it has been often confounded, from malignant sore throat, and from the crowing inspiration or spasm of the glottis.

It is farther important to be aware of the fact, that the symptoms of Croup may be simulated not only by the diseases now enumerated, but by several others, as well as by various accidental injuries incident to the throat and windpipe. Thus, symptoms of croup have been known to be imitated by disease of the thyroid gland, tumours compressing the windpipe, polypi, and other tumours in the posterior *nares* and pharynx, extraneous bodies getting into the *larynx* or *trachea*, abscesses taking place at the lower surface of the muscles covering the larynx, or at the posterior part of the pharynx, bronchial polypus, various diseases of the arch of the aorta, as aneurism, and even several affections of the jugular veins.

TREATMENT.—In the treatment of croup the great object is to subdue inflammation at a period so early of the attack as to prevent or obviate the formation of the morbid secretion from the tracheo-bronchial mucous membrane. With this view the disease may be distinguished into two stages; the inflammatory, and the effusive or secretory. In the early stage of the disease, therefore, the only indication is to subdue inflammation and prevent the secretion of plastic fluid. In the second stage to this indication must be added another, that of facilitating the ejection of the secreted product. The first is the only one on which the physician can depend; as the second is too often abortive.

With the intention of fulfilling the first indication, the chief measures to be employed are blood-letting, general and local, emetics at the commencement, and afterwards in nauseating doses, diaphoretics, revellents, and cathartics.

In every case of decided croup, it will be safe, and in general most necessary, to draw blood to the extent of two, three, four, or six ounces, according to the age of the patient, the intensity of the symptoms, and the effect produced; and in some cases it may be necessary to repeat this evacuation. Its efficacy is always most decided when performed early, and therefore the moment the disease is recognized, or there is evident heaving and labour in the respiration, with quick but small pulse, a vein should be opened in the arm or in the neck.

After general blood-letting, it is often important to apply leeches to the front of the windpipe, and produce a considerable local discharge from the neck; and in children as much may be taken in this manner as by a full bleeding from the arm. To this, however, there are three objections. It is always difficult to ascertain the quantity drawn; a considerable time elapses before it is completed, and in the meanwhile the child is weakened, and rendered more irritable; and lastly, it is sometimes not easy to check the hemorrhage, unless the medical attendant remain the whole time. With these restrictions, however, local blood-letting is a powerful and safe adjuvant to general depletion in the treatment of croup.

In every case of croup, it is important to administer an emetic at the commencement of the symptoms, with the view both of abating inflammation and counteracting its effects, and also preventing or arresting the secretion of the plastic fluid.

The most convenient medicine for this purpose is from ten to twenty grains of ipecacuan, with from half a grain to a grain of tartrate of antimony. Afterwards, and during the whole course of the disease, unless at the periods when cathartic medicine is given, it is proper to exhibit tartar emetic in minute or nauseating doses, both with the view of abating inflammation and the intensity of the febrile symptoms, and also to facilitate expectoration. The tartrate of antimony presents peculiar advantages, in its solution being at once colourless and tasteless; and from a teaspoonful to half an ounce of a solution, containing one grain in each ounce of water, should be given every hour.

Other emetics may be employed in the same manner, and with similar intentions. The sulphate of copper, originally proposed and employed by Dr Ferriar, has been much used and

commended by Dr Hoffmann of Darmstadt, and Dr Droste of Osnaburg, both as an emetic and as a nauseating and antiphlogistic expectorant remedy. The mode of administration is to give one, two, or three grains at the commencement, so as to induce full vomiting, with little sickness, and afterwards to continue the employment of the remedy in minute doses, at remote intervals. The latter, however, is, according to Dr Droste, in general unnecessary; because the first dose, by the violent vomiting excited, forcibly detaches the membranous incrustation from the interior of the windpipe. According to this view, therefore, the blue vitriol in the full dose is best calculated for the second or secreting stage of the disease; and the small doses, which induce profuse perspiration, for the early or inflammatory stage.*

The sulphate of zinc might be exhibited with the same intention, and in a similar manner. Mr John Smith of Philadelphia employed it in combination with tartar emetic, in the proportion of fifteen grains of the former to eight of the latter, in an ounce and a-half of water.†

It is, in all cases and at all stages of croup, important and necessary to administer cathartics, both as means of abating fever and diminishing plethora, and because it often happens that the alimentary canal is, previously to attacks of the disease, disordered and loaded with foul secretions. It is, however, not requisite to purge violently, since evacuations from the intestinal tube have less influence in subduing tracheo-bronchial inflammation than blood-letting and diaphoretics. If the bowels are kept open by means of calomel and jalap, followed by the saline infusion of senna, it is in general sufficient. Castor oil is often useful in this disease; and seems to exert a peculiar influence.

Of diaphoretics, next to antimonials, the best is the warm bath, in which the patient should be immersed at the onset of the disease; and afterwards, at least once or twice daily. Where the warm bath cannot be obtained, immersion of the lower extremities (*pediluvium*) in hot water, is beneficial.

Expectorants are sometimes employed in croup with apparent benefit. The chief objection to their use is the long time oc-

* *Annales Clinicæ Scholæ Heidelbergensis*, 1834, Vol. x.; and *Edinburgh Medical and Surgical Journal*, Vol. xlv. p. 246.

† *Mem. Med. Society*, Vol. vi. p. 74. Lond. 1805.

cupied before they take full effect, unless in the case of the emetic and nauseating expectorants. Demulcents are also useful; and of these, the inhalation of the vapour of warm water, or vinegar in warm water, or sulphuric ether, has been recommended.

Revellents or counter-irritants, especially those which act rapidly, are beneficial. The ordinary blister may be applied on the front of the neck and sternum, or between the shoulders, or a liniment, consisting of equal parts of oil of turpentine and ammonia, may be rubbed over the neck and chest. By those who have approved of revulsion, but regarded the common blistering plaster too slow a measure, it has been proposed to vesiccate the surface of the neck and breast by the sudden application of the steam of boiling water; and an ingenious contrivance for employing this measure, without injury to the other parts, was contrived several years ago by Dr Gosse of Geneva. It does not appear, nevertheless, to have come into general use.

Besides the remedies now mentioned, several have been employed in the treatment of croup which have been believed to exert a specific influence. Of these, the most important are calomel and the sulphuret of potass.

For the introduction of calomel as a remedy in the treatment of croup, we are chiefly indebted to the American physicians, especially Rush, Bard, Kuhn, and Anderson, who administered this mineral in considerable doses, with the twofold view of suspending the secretion of plastic lymph, and detaching the membranous crust when effused by the induction of healthy mucous secretion. The method of exhibition varied in the hands of different practitioners. Kuhn gave an infant of two years from 5 to 6 grains of calomel three or four times daily. Redmann gave the youngest and most delicate infants 3 grains every third hour until 15 had been taken; and Anderson gave an infant of four 45 grains of calomel in the course of fifty hours. The practice was imitated by several of the English and German physicians, as Hamilton among the former, and Girtanner, Marcus, and Autenreith among the latter. Dr Hamilton gave a girl of seven years 133 grains of calomel in the course of sixty hours; Marcus gave an infant of two from 5 to 10 grains every hour; and Autenreith gave a grain every twenty minutes.

The expectations created by the result of the cases in which this mineral was thus exhibited have not been realized in the experience of other physicians. Neither Cheyne, Jurine, Albers, Haase, nor Joseph Frank, have observed, from the administration of calomel in croup, the beneficial results represented to take place in the practice of the individuals above-mentioned. They could recognize in it no specific virtue; and often they thought that it was inferior to other therapeutic agents. It has also been ascertained, that the exhibition of calomel in the manner specified is not altogether free from danger. It possesses a remarkable power of irritating the intestinal mucous membrane, and inducing inflammation with exhausting diarrhœa, and so great diminution of the general strength, as sometimes itself to contribute to the fatal event. In one case, in which I was induced, in compliance with the general custom, to exhibit calomel in the manner indicated, I saw it induce this intestinal irritation in a degree so intense, as to make me entertain great apprehensions for the safety of the child from intestinal inflammation; and unless I had administered repeated emollient and laxative *enemata*, and afterwards exhibited small doses of castor oil, there was every indication of the approach of intestinal inflammation, which might have terminated fatally. On this head, I refer also to the testimony of Leopold Golis, as given in his work on Water in the Brain.

From these several facts, I conceive it results that calomel is an agent which should not be exhibited in the treatment of croup, with the view of affecting the constitution; and when it is given, it should be merely as a cathartic, in which case it should be conjoined with colocynth, scammony, rhubarb, or jalap.

Mercurial ointment has been rubbed over the throat with the same intention. But it can possess no specific sanative powers; and the remarks already made on the physiological and therapeutic effects of calomel are applicable in this case to mercurial ointment.

The sulphuret of potass (*Hepar sulphuris*) has been proposed to be administered with the view of promoting the separation of the plastic incrustations. By one anonymous person it was exhibited in doses of from 6 to 10 grains in honey or syrup twice daily; but for an agent so irritative this was certainly too much in the case of infants; and to delicate infants, Hil-

denbrand proposes a grain and a-half in the form of linctus or pill every second or fourth hour. Joseph Frank informs us that he has only three times exhibited the medicine, and each time, he adds, he did it with regret, as it not only produced no benefit, but added much, by its unpalatable taste, to the sufferings of the patient. Its safety may be justly called in question, as it is known to be an irritant poison capable of exciting inflammation of the stomach (*gastritis*.) It is further quite unnecessary, as the object with which it is given may be more safely accomplished by means of sulphate of zinc or tartrate of antimony.

Similar objections are applicable to ammonia, the exhibition of which has been recommended in order to dissolve and detach the plastic incrustations and shreds.

At a period when the morbid anatomy and pathology of croup were imperfectly known, and when the distemper was confounded with *laryngitis*, it was proposed to supply the inefficiency of medical treatment by means of surgical operation, and to make an incision into the windpipe, and thence extract the concrete membranous crust by which its canal was always believed to be obstructed. It is now known that this operation is quite inapplicable to croup. Though, by the performance of tracheotomy the false membrane or tubular crust could be extracted, the disease could not thus be cured, nor would life thereby be saved. The *bronchi* and their smaller tubes would still remain filled by the semifluid and fluid matter which is the product of the tracheo-bronchial inflammation: and the operation would consequently remove only the smallest and least important part of the disease. By the operation of tracheotomy, in short, the practitioner proposes to act not on the disease itself, but only on one of its effects. To treat the distemper efficiently, and with success, it is indispensable to employ those measures which are most directly and powerfully calculated to operate on the distemper itself, and the morbid action in which it consists.

§. IX. *Laryngia* ; *Laryngitis* ; *Angina Laryngea*. Inflammation of the Larynx. *Cynanche Laryngea*. Sauvages and Cullen.

Three Cases of Inflammation of the inner Membrane of the *Larynx* and *Trachea* terminating quickly in death. By Matthew Baillie, M. D. &c. Read 3d October 1809.—Transactions of a Society, Vol. iii. p. 275, London, 1812.—

Cases of *Cynanche Laryngea*, By J. R. Farre, M. D. Medico-Chirurgical Transactions, Vol. iii. p. 84, London, 1812.—Appendix to the Paper on *Cynanche Laryngea*, by J. R. Farre, M. D. Ibid. p. 323.—The History and Dissection of a fatal case of *Cynanche Laryngea*, by Edward Percival, M. D. Medico-Chirurg. Trans. Vol. iv. p. 297, London, 1813.—Case of *Cynanche Laryngea*, with remarks, by Thomas Wilson, Esq. Surgeon, Stewarston. Medico-Chirurgical Transact. Vol. v. p. 156, London, 1814.—Case of *Cynanche Laryngea* successfully treated by John Armstrong, M. D. Ed. Med. and Surg. Journal, Vol. xx. p. 284, Edin. 1814.—Successful Treatment of a case of *Cynanche Laryngea*, by James Watson Roberts, M. D. of Bishop Stortford. Medico-Chirurg. Transact. Vol. vi. p. 134, Lond. 1815.—[This is the history of the first attack of Sir John Macnamara Hayes in July 1794, of which the second and fatal one had been previously published by Dr Baillie in the Transactions of a Society, &c. Vol. iii. p. 280.]—Remarks on the preceding case of *Cynanche Laryngea* by the President of the Society (Sir G. Blane), Ibid p. 141.—Account of a case of Croup in which the operation of Bronchotomy was successfully performed by Thomas Chevalier, Esq. F. L. S. Ibid p. 150. (This seems to have been a case of *Cynanche Laryngea*)—On some affections of the Larynx which require the operation of Bronchotomy, by William Lawrence, Esq. F. R. S. Medico-Chirurgical Transactions. Vol. vi. p. 220, London, 1815.—Case of *Cynanche Laryngea*, by John Abercrombie, M. D. Edin. Med. and Surg. Journal, Vol. xii. p. 205.—Cases of *Laryngitis* by Dr Ninian Hill, Ibid. p. 439, Edin. 1816.—Case of *Cynanche Laryngea*, by Dr Arnold of Stamford. Medico-Chirurg. Trans. Vol. ix. p. 31, London, 1818.—Case of *Laryngitis* by A. Wood, M. R. C. Surg. Edinburgh Med. and Surg. Journal, Vol. xv. p. 542, Edin. 1819.—A case of Chronic Inflammation of the Larynx, in which Laryngotomy and Mercury were successfully employed, by Marshall Hall, M. D. Medico-Chirurg. Transactions, Vol. x. p. 166, London, 1819.—Case of *Cynanche Laryngea*, with appearances on Dissection, by James Anders. Edin. Med. and Surg. Journal, Vol. xvi. p. 156, Edin. 1820.—Cases of *Cynanche Laryngea* successfully treated by Edmund Tatham, Surgeon. Ibid p. 519, Edinburgh, 1820.—Case of *Cynanche Laryngea*, by Alex. Cockburn, Surgeon. Ibid. Vol. xix. p. 202, Edin. 1823.—Observations on the Surgical Pathology of the Larynx and Trachea, &c. by William Henry Potter, M. M., Lond. and Edin., 1826.

On the Chronic forms of the disease, the following are the principal sources of information. Morgagni de Sedibus et Causis, &c. Epist. xxii. 27, 31.—Bursarii Institutionum, Med. Pract. Vol. iv. §. lvii. et §. lxii. Lipsiæ, 1790. Double Bullet. de la Societ. de Med. p. 195. Thomann Annales Institut. Medico-Clinici Wirceburg, 1799. Vol. i. p. 162; and ii. p. 285.—Wathen, Mem. Med. Society, Lond. Vol. i.—Sauvée Recherches sur la Phthisie Laryngée. Paris, 1808.—Schoenbach, Diss. de Phthisi Tracheali. Vilnae, 1808.—Cayol, Recherches sur la Phthisie Tracheale. Paris, 1810.—Bedingfield, Compendium of Medical Practice. Lond. 1816. p. 86, 88.—Kulesza, Diss. de Phthisi Laryngea et Tracheali. Vilnae, 1821.

“This name, (*Cynanche Trachealis*)” says Dr Cullen, “has been given to an inflammation of the glottis, larynx, or upper part of the *trachea*, whether it affect the membranes of these parts or the muscles adjoining. It may arise first in these parts, and continue to subsist in them alone, or it may come to affect these parts from the *cynanche tonsillaris* or *maligna* spreading into them. In either way it has been a rare occur-

rence, and few instances of it have been marked and recorded by physicians. It is to be known by a peculiar croaking sound of the voice, by difficult respiration, with a sense of straitening about the larynx, and by *pyrexia* attending it.

“From the nature of these symptoms, and from the dissection of the bodies of persons who had died of the disease, there is no doubt of its being of an inflammatory kind. It does not, however, always run the course of inflammatory affections, but frequently produces such an obstruction of the passage of the air as suffocates, and thereby proves suddenly fatal. The accounts which books have hitherto given us of inflammations of the larynx and the parts connected with it amount to what has now been said; and the instances recorded have almost all of them happened in adult persons.”—Cullen’s First Lines, cccx. cccxi. cccxii. cccxiv.

This passage I quote to shew the influence of authority in confounding two diseases essentially distinct. Since the time when Dr Cullen delivered the above description, which manifestly applies to laryngeal inflammation, and joined with many other authors in directing the attention of physicians to the croup, or suffocating disease of infants, it had been almost forgotten that a disease not unlike in symptoms, but different in its seat, was incident to persons of all ages, but more especially to plethoric or robust adults. The rapid progress of this affection and its fatality to two eminent physicians, (Dr David Pitcairn and Sir John Macnamara Hayes), and several other persons, have at length procured for it a degree of attention which had been previously completely engrossed by croup, and have shown in what manner it may be distinguished from this malady. I must not omit to notice also, that, by uniting the above description with that of croup, Dr Cullen evidently led many practitioners to think that both diseases were the same, and left to the physicians of the present day, the merit of observing and drawing a more accurate distinction. In the account which I am to deliver of this disease, I follow the authorities now quoted, in considering laryngitis as a peculiar inflammation, quite distinct from croup or effusive inflammation of the windpipe.

The disease named *laryngitis* consists in inflammation of the mucous membrane lining the laryngeal cartilages, from the epiglottis and upper margin of the thyroid, to the connection of the cricoid cartilage and the *trachea*. It commences with

the usual feelings of sore throat, which are often so trifling as not to confine the patient, or even attract his attention; but very soon assumes the peculiarity of character by which it is distinguished. The sense of uneasiness gradually becomes more urgent, and, from being diffused generally over the throat, is more limited to a particular spot,—the site of the lower margin of the thyroid cartilage, and that of the arytenoid cartilages. At the same time the breathing is much affected, and performed with great rapidity and laborious anxiety, and the larynx is moved violently and suddenly at each respiration. The voice becomes hoarse and loses its *timbre*, becoming either shrill or rough, or is sometimes completely lost (*aphonia*,) at least that which is formed in the *larynx*, so that the patient speaks in a whisper, and with the lips and teeth only. These local symptoms are accompanied with great general commotion in the system. The pulse is very quick and sharp; the skin is generally hot and dry, the tongue is covered with a white viscid fur; the thirst is considerable, with other symptoms of inflammatory fever.

These are the general and most uniform characters of laryngeal inflammation. In some instances there is a degree of external swelling obvious to sight. The space termed *isthmus* of the throat is sometimes red and swollen, but this is not uniform; and a violent laryngeal inflammation has been known to exist, without presenting any redness visible in the throat. In some instances the epiglottis may be felt enlarged and painful, but the disease may exist in all its intensity without this.

It may also happen that the difficult breathing and anxiety may be augmented for a short time to an urgent sense of suffocation, when the countenance becomes pale and ghastly, and the features are contracted, or sometimes bloated, livid, and discoloured; and the breathing is performed with a hissing or croaking noise, interrupted with frequent gasps. After this has continued for some time not unlike a paroxysm of asthma, it either suddenly or gradually is alleviated, and the patient appears for a short time to be freed from his most urgent distress. The breathing, however, is equally rapid, and the pulse equally quick, though not quite so small as it was. In a short time the symptoms recur in the same form and severity, and continuing for some time to the great distress and exhaustion of the patient, at length undergo a similar remission. This forms what has been termed the spasmodic croup of some au-

thors. It would be erroneous, however, to imagine, that because this symptom recurs in fits, and admits of temporary alleviation, the disease was of a spasmodic nature only. The spasmodic aggravation is superadded to the inflammatory action, in consequence of the peculiar functions of the parts inflamed, and the irritation caused to the muscles of the larynx, intrinsic and extrinsic, by the presence of inflammation.

In some instances during the fit of difficult breathing, and always as the disease advances, more or less stupor comes on. The jugular veins are distended, the face swelled and bloated, and the pulse becomes small and irregular. These symptoms denote that the impediment to respiration and circulation through the lungs, is operating on the circulation of the brain, and retarding the free return of blood from the vessels of that region.

Many dissections have shown that the symptoms now enumerated arise from inflammation circumscribed to a very definite region of the larynx. It has been found that the whole laryngeal membrane, from the *epiglottis* to the *trachea*, is red and swelled, occasionally with much thickening and induration of the former part. But the particular point at which this morbid action is most injurious is at that part of the mucous membrane which covers the arytenoid cartilages, and forms the chink or fissure called *glottis*. This part of the laryngeal membrane is not perhaps more swelled than any other; but a moderate swelling in this point soon diminishes the aperture so much, that the danger of suffocation becomes urgent. At the same time it must be observed, that a peculiar œdematous or puffy swelling, similar to that which sometimes affects the eyelids, prepuce, and female *labia*, has been found, in many instances of this disease, to occupy the margins of the glottis, in consequence of serous fluid infiltrated into the submucous filamentous tissue; and the effect of this swelling is to diminish, or in some instances to obliterate entirely, the opening which regulates the admission of air into the *trachea*. This state constitutes what has been termed *œdema glottidis*.—(Thuillier, 1805. Bayle, 1819.)

The red and swelled state of the laryngeal membrane is in some instances more conspicuous at its posterior part than elsewhere; the epiglottis has been found red, swelled, and thickened; but whatever variety of appearance the disease presents

in other situations, its effect on the membrane of the glottis is very uniform, and this aperture is either much narrowed or entirely obliterated.

With the redness and swelling, the laryngeal membrane is often occupied with viscid thick mucus, which in some instances contributes, by adhering to the margins of the *glottis*, to obstruct the opening. It is generally found in great quantity in the recesses called *sacculi*, where it assumes the appearance of purulent fluid. In some rare instances suppuration takes place, and small purulent abscesses have been found in the thyroid cartilages or their investing membrane. In some instances the tracheal mucous membrane is reddened; but this is not essential to the disease.

This short account of the appearances found after death will enable the reader to form an opinion on the nature of the disease. It is evidently quite distinct from croup, with which it had been confounded, both in the particular locality to which it is restricted, and also in the pathological action by which it is distinguished. It is evident that it consists in an inflamed state of the mucous membrane, which covers the various cartilages and intrinsic muscles of the larynx, but that this inflamed state would not produce the peculiar symptoms, unless in consequence of the configuration of the opening called *rima glottidis*. It is the inflamed and swelled state of the parts forming this aperture on which depend the cutting pain, the whispering, hoarse or lost voice, the extreme difficulty and rapidity of respiration, and the anxiety with which this motion is performed; and the rapidity and early period of the morbid action at which this opening becomes obstructed, prevents in general perfect suppuration, and the other consequences of inflammation. The contraction, diminution, or obstruction of this aperture is in truth the essential pathological character of the disease, on which all the other phenomena depend, and without which the disease has no existence.

This disease may be said to have three terminations; 1st, by resolution, which takes place some time between the 36th and the 60th hour; 2^d, by fatal suffocation, which may take place any time after the 30th hour; 3^d, by becoming chronic, with suppuration or ulceration of some part of the organ, which may be expected if the disease continues without proving fatal for four revolutions of twenty-four hours.

The termination by resolution consists in a gradual diminution of the swelling, with abatement of pain, difficult and laborious breathing, and return of voice, and expectoration of tenacious mucus;—in some instances the voice continues hoarse or is entirely lost, when the other symptoms have disappeared;—an effect which is to be ascribed to effusion of lymph into the sub-mucous cellular tissue, or between the intrinsic muscles of the larynx. This mode of termination is not frequent, but several instances have occurred. Termination by suffocation, the most common, is easily understood from what has been already said of the morbid anatomy of the disease. The third mode of termination is not frequent, but it has occurred. It is easily known by the usual symptoms becoming less severe, but more permanent. It may terminate in suppuration or ulceration, when it is attended with a greater or less degree of wasting and hectic fever, forming the disease which has received the name of laryngeal phthisis.

Laryngitis, though in general a primary and idiopathic disorder, may occur, however, in a secondary form in the course of other diseases. Thus it is very common in confluent small-pox when there is much affection of the base of the tongue and throat, and may be so violent as to prove fatal either before the eruption is completed, or soon after. In other cases, after the acute stage of the disease is over, the laryngeal inflammation lingers in a subacute or chronic form with occasional acute attacks for days or even weeks. A case of this kind in a boy of 5, in the spring of 1835, required the repeated application of leeches, with opiates and antispasmodics, before the laryngeal inflammation was subdued.

Secondary laryngeal inflammation may also take place in measles and in croup.

The causes of *laryngitis* are the same as those of inflammation of the breath passages in general. The predisposing circumstances are full and plethoric habit in the adult or aged, great delicacy of constitution in the young, residence in maritime situations, and cold damp seasons, or seasons distinguished for great vicissitudes. In general two or more cases of the disease occur about the same time.

The exciting causes are exposure to cold while the body is overheated, wetting the feet, wetting the neck, repeated and long-continued efforts in speaking, singing, or hollowing. In

the case of Sir John M. Hayes, the first attack, in 1794, was induced by incautious exposure at an open window to the night air for some time, while undressed, and in a profuse perspiration, with a strong breeze blowing on him. In a well-marked case which fell under my own observation, the symptoms ensued after bathing in the Frith of Forth when rather heated. In other instances it is difficult, if not impracticable, to recognize the exact mode and period of exposure. Children from tropical climates, for instance the West Indies, are occasionally attacked by the disease soon after their arrival in Europe.

Individuals who have once been attacked by laryngeal inflammation are liable to it afterwards upon the application of any of the exciting causes. In the case of Sir J. M. Hayes, fifteen years elapsed between the first and the second and fatal attack. In a young Creole of $3\frac{1}{2}$, who had the disease distinctly soon after his arrival in Scotland, and in whom it was subdued only by copious blood-letting from the arm, a second attack was induced about twelve months afterwards by measles, and required the same remedies for its removal.

One cause of laryngeal inflammation which operates at once as a predisponent and an exciting cause, deserves notice in this place. In persons who have been subjected to the influence of mercury, either once or oftener, whether from the irritability induced in the mucous membrane by the operation of that mineral, or from the general morbid excitement induced and maintained by the irregular and intemperate habits of most persons requiring the exhibition of the mineral, a state of chronic and habitual irritation is first generated in the laryngeal mucous membrane, which eventually terminates in chronic inflammation; or upon the sudden application of any energetic cause, as thorough exposure to cold or moisture, an acute attack is superinduced, assuming the usual urgent symptoms, and requiring for its removal the prompt employment of antiphlogistic measures, and sometimes even the performance of tracheotomy to avert impending suffocation. Upon the subsidence of these acute attacks the membrane continues in a state of irritation or chronic inflammation, is somewhat thickened and rough, rendering the voice hoarse, rough, croaking, and occasionally broken and suspirious; and eventually ulceration takes place over the arytenoid cartilages; or matter is formed in the submucous tissue;

and under constant irritative cough and hectic fever the patient dies tabid.

There are still other varieties of chronic *laryngitis*. The one most frequent, perhaps, is that in which the cartilages becoming ossified, and afterwards carious or necrosed, act as sources of irritation, like foreign bodies, and give rise to inflammation and suppuration, first of the submucous filamentous tissue, and then of the mucous membrane itself. This disease, which has been fully described by Mr Porter, is probably the one which Sir Gilbert Blane mentions in his Remarks on the case by Dr Roberts as having fallen under his observation.

Acute *laryngitis* must be distinguished from croup, with which it has been often confounded, from tonsillary inflammation, from *angina maligna*, from catarrh and *bronchitis*.

Chronic *laryngitis* is in general easily recognized; but at the advanced stage it is liable to be confounded with pulmonary consumption and chronic *bronchitis*. A disease, in all respects imitating it, is liable to be induced by various affections of parts connected with the larynx; for instance, abscess in the muscles of the larynx or in the front of the neck, tumours and polypi in the posterior nasal *fossae*, and in the pharynx, aneurism of aorta, *innominata*, and carotid artery, bronchocele, venereal and mercurial ulceration of the throat, inflammation of the tongue (*glossitis*,) and even inflammation of the tonsils (*antiaditis*.)

TREATMENT.—In the treatment of acute *laryngitis*, the great object of the physician is to give the inflammation a check so sudden, complete, and decided, as to prevent the infiltration of serum into the submucous tissue of the arytenoid cartilages, and the secretion of purulent matter in the *sacculi laryngis*. For the accomplishment of this object, the principal reliance must be placed in the prompt and energetic adoption of the antiphlogistic treatment in all its divisions. On the first clear indications of the disease, blood must be drawn from the arm to as great an extent as the patient can bear; and invariably, if carried at first to faintness or nearly so, it will be much more effectual and prompt in controlling the disease than in smaller quantity, or in the same quantity drawn at two or more several times. The quantity drawn in this manner will vary according to the strength of the individual, from 20 to 35 ounces for an adult, and from 6 to 12 for a child of six or seven years. I have drawn 25, 30, and 35 ounces at a single blood-let-

ting for the extinction of this disease, and been under the necessity of repeating the blood-letting at an interval of six hours to the extent of 12 and 16 ounces. In a delicate boy of $3\frac{1}{2}$, I drew at the first 6 ounces of blood, at two in the morning, and at seven, five hours afterwards, I found it requisite to draw 4 ounces more before the laryngeal respiration lost its characteristic croaking sound.

To this mode of treatment there is only one exception. In the acute and subacute attacks supervening in chronic laryngeal inflammation, large blood-lettings have less influence, and are less requisite. A blood-letting of from 12 to 15 or 20 ounces is then in general sufficient to moderate the acute symptoms so far as to allow the operation of other remedies, as local bleeding by means of leeches, and the antiphlogistic powers of tartrate of antimony.

Local bleeding by means of leeches has been recommended as useful, next to general blood-letting, in acute laryngeal inflammation. But to this evacuation the practitioner must not trust. Local bleeding exercises too little effect on the disease, and is too tedious in its operation to be admissible; and unless the urgent symptoms are decidedly controlled by means of general bleeding, too frequently the disease proceeds to the fatal termination. The exposure also, and the fatigue to which the application of leeches to the throat subjects the patient, is a great objection to their employment; and the practitioner will act most wisely if, by the prompt employment of venesection, he supersedes the necessity of using them.

Next to general blood-letting, the great means of counteracting laryngeal inflammation and obviating its effects, consists in the use of antimonials in nauseating doses, cathartics, and the revellent powers of the blister.

Of cathartics any may be given. But the most convenient is calomel and jalap, or colocynth, followed by the saline infusion of senna and castor oil. Calomel with croton oil is also useful.

The efficacy of blisters has been highly commended by Sir Gilbert Blane, on the ground that in all the successful cases that remedy was employed. It is to be observed, however, that in all the successful cases copious general blood-letting had been previously, or at the same time, adopted. The blis-

ter is useful as an adjuvant ; but to it alone it is imprudent to trust.

Many put much faith in the use of calomel and opium. After, and along with blood-letting, it is useful, or rather not injurious ; but without it utterly useless, and, I have sometimes thought, not free from danger.

The warm bath is a useful remedy, especially for children, and it is always desirable to immerse the lower extremities in warm water.

For the chronic forms of the disorder, and also the subacute attacks, the best remedies are local bleeding by means of leeches frequently repeated ; the application of blisters over the front of the throat, and even the insertion of a seton over the thyroid or cricoid cartilage.

When in the acute form of the disease, or in the subacute attacks supervening in the chronic form, the antiphlogistic remedies above specified seem unavailing, and the symptoms become more formidable, with hourly increasing danger of impending suffocation, the proper measure is the operation of tracheotomy, and the insertion of a tube through the wound. Though the performance of this operation belongs properly to surgery, I may mention here that it requires two precautions. The first is, that the incision and opening into the windpipe be made below the seat of the arytenoid cartilages, and consequently below the point of the laryngeal constriction. This is requisite upon the principle of substituting temporarily an artificial *glottis* for the natural one while obstructed ; and I may add, that the operation has been performed above the *rima*, and consequently been of no use. The second precaution is, that, in making the requisite incisions, it is necessary, before dividing the windpipe, to see that there be no hemorrhage from divided vessels, which is likely to escape into the windpipe. In general, the best plan is to push aside vessels, especially veins, rather than to divide and tie them, as the ligature of a vein is always a dangerous expedient. If hemorrhage continue, it is liable, by blood trickling into the windpipe, to produce the evil which the practitioner wishes to avert.

As soon as the opening into the windpipe is completed, a full inspiration is drawn in through the wound, and several forcible expirations with coughing succeed, causing the expul-

sion of a considerable quantity of mucus, which could not be expelled through the contracted aperture of the *glottis*. This is followed by relief, and in a few days all the urgent symptoms disappear, and the laryngeal opening becomes gradually pervious.

§. X. Murr,* Chapman. Catarrh? Bastard or Spurious Peripneumony? Defluxio; Destillatio. *Bronchitis propria*; *Bronchiasis*.

A Radical and Expeditious cure for a recent Catarrhus Cough. By John Mudge, London, 1778.—On Catarrh, Vis Vitae, and Compound Fractures. By John Mudge, 12mo, London, 1782.—Histoire des Phlegmasies ou Inflammations Chroniques, Tome i. Paris, 1808, and 2de edit. Paris, 1822.—Observations on the Inflammatory affections of the Mucous Membrane of the Bronchiaë. By Charles Badham, M.D. &c. Lond. 1808.—The Pathology of the Larynx and Bronchiaë. By John Cheyne, M.D. Edin. 1809, pp. 187, 195.—Practical Illustrations of the Scarlet Fever, Measles, Pulmonary Consumption, and Chronic Diseases, &c. By John Armstrong, M.D. London, 1818. Section 2d and 3d.—A Treatise on Inflammation of the Mucous Membrane of the Lungs. By Charles Hastings, M.D. &c. London, 1820.—De l'Auscultation Mediate, ou Traité du Diagnostic des Maladies des Poumons et du Cœur, par R. T. Laennec, ii. Tome, 8vo. Paris, 1819, 2de edit. 1826, 3ieme edit. 1831.—English Translation by Dr Forbes, 1821, 1827, and 1835.—On the Pathology of Consumptive Diseases. By John Abercrombie, M.D. Ed. Med. and Surg. Journ. Vol. xvii. p. 46. Edinburgh, 1821.—Observationes Anatomico-Pathologici et Practici Argumenti Auctore J. L. C. Schroeder van der Kolk, M., et Art. Obs. Doct, Fasciculus I. Amstelodami, 1826.—Observations on Bronchitis, chiefly relating to its Pathology and Treatment. By H. W. Burrell, M.D. 72d Regiment. Edin. Med. and Surgical Journal, Vol. xxvii. p. 293, and Vol. xxviii. p. 29. Edinburgh, 1827.—On the Pathology and Diagnosis of Diseases of the Chest. By C. B. Williams, London. 1828. 3d edit. 1835.—Observations on Bronchitis, from the presence of Foreign Bodies in the Bronchial tubes. By David Craigie, M.D. Edin. Med. and Surg. Journal, Vol. xlii. p. 103 and 379. Edin. 1834.

The mucous membrane of the windpipe, bronchial tubes, and minute divisions named air-cells, is liable to inflammation in various degrees, and perhaps in different forms. I have already given a short history of one of these forms of disease under the name of Croup. But practical authors record examples of other forms of bronchial inflammation, under the names of Catarrh, Bastard Peripneumony, and *Bronchitis*, acute or chronic. The literary history of these varieties of bronchial disease is neither useless nor uninteresting, and was first given by Dr Badham in his practical Treatise on *Bronchitis*, and afterwards

* This term, which is corrupted from the French "Morve," is used by G. Chapman, in M. D'Olive, to express a severe cold or a catarrh.

by Dr Hastings in his Treatise on Inflammation of the Mucous Membrane of the Lungs. As the limits of the present work do not allow me to enter on this subject, I feel much pleasure in referring to authorities so excellent for particular information; and I shall restrict myself to an enumeration and description of the varieties of bronchial inflammation most commonly observed in practice.

In order to communicate a distinct idea of the disease, I think it expedient to consider it under two different forms; 1st, that commonly known under the name of catarrh; 2d, the proper acute *bronchitis*, or what has been described by several authors under the name of spurious or bastard peripneumony; but these again are liable to be modified according to the kind of subjects in whom they occur, the complications with which they are combined, and the acute, subacute, or chronic nature of the inflammatory process itself, in which they consist.

a. Catarrh. Catarrhus Cough. Tracheo-bronchial Irritation. *Tussis Catarrhalis et rheumatica*, Hoffmann. *Infreddatura*, Italis. *Romadizo*, Hispanis.

Practical and nosological writers have distinguished catarrh by different appellations, according as it affects different parts of the cephalo-tracheal mucous membrane, according as it depends on different remote causes, and sometimes according as it depends on a direct affection of the tracheo-bronchial membrane, or on one induced there by irritation from some other organ. In the present case I confine the description to acute catarrh, the essential character of which is irritation or inflammation spreading continuously and successively over an extensive membranous surface.

By several authors, systematic and practical, as Hoffmann, Rosen a Rosenstein, Mudge, and Borsieri, the disease has been described under the title of cough (*tussis*); and this symptom is certainly the most conspicuous one of irritation of the tracheo-bronchial membrane. But as it is only a symptom, and as it is further a symptom of many other affections of the organs of respiration and the pulmonic tissues, and sometimes of diseases of other organs, very different from that denominated catarrh, we discard this entirely as a nosological epithet, and employing it in its strict sense as the name of a

symptom only, I shall describe the disease under the more accurate name of Catarrh.

The complaint generally begins with frequent sneezing, some difficulty of breathing through the nose, with a sense of fulness stopping the nostrils, dull pain and weight of the forehead (*carebaria*; *gravedo*,) stiffness in the motion of the eyes, and occasionally slight lacrymation. At the first appearance of these sensations the nasal mucous membrane is dry and rather sore and hot. Very soon, however, a thin fluid begins to ooze from the eyes and nasal membrane, and distil from the nostrils; and as the parts are raw and tender, the fluid, which has been regarded as acrid, is supposed to fret and chafe them. The sense of smell is completely gone. These symptoms, which constitute the *Coryza* and *Gravedo* of authors, are attended with a sense of lassitude and languor over the whole body, greater sensibility than usual to cold air, and even occasional shiverings, some heat and dryness of the skin, and the contractions of the pulse about ten or twelve beats more frequent than ordinary, especially in the evening.

These symptoms seldom continue long without being accompanied with some hoarseness, a sense of roughness and soreness in the throat and windpipe, a slight sense of tightness or constriction in the breast, and with cough, which seems to arise from irritation in the *glottis*. In some instances a sharp cutting sensation is felt in the throat, as if an angular body were fixed in it; and the sensation is aggravated by speaking, coughing and deglutition. The cough is at first dry and painful, causing uneasiness in the breast, or course of the windpipe, and in the larynx; and not unfrequently the patient complains of wandering pains in the head, back of the neck, chest, loins and limbs generally. With these symptoms are associated loss of appetite, sometimes with furred tongue, and either loss of taste, or a bad taste in the mouth, thirst, hot skin, scanty sedimentous urine, and feverish lassitude over the whole body.

The symptoms now enumerated mark the height and intensity of the disorder; but they are seldom of long duration. Gradually the sharp cutting sensation in the throat abates; the cough is attended with some excretion of mucus, which is at first thin and sharp, but gradually becomes thick and opaque, and is easily brought up; the hoarseness and soreness of the windpipe are also relieved; and, as the febrile symptoms abate,

the expectoration diminishes in quantity, and the cough recurs less frequently, until at length both entirely cease.

This is the usual course of an ordinary catarrhal attack, not aggravated by any improper management. In general, it terminates, as above described, in the course of eight or ten days, and it does so more readily where the patient is not again exposed to cold, and confines himself to low diet, or at least avoids the use of animal food, and wine, or malt liquor. When the individual, however, is exposed to cold, especially during the night, while the disease is still proceeding, all the symptoms are in general aggravated, and in this manner the complaint may be protracted much beyond its legitimate limits. Such additional exposure, while the person is still susceptible, and the tracheo-bronchial membrane irritable, may cause one of five results;—1st, another more violent attack of catarrh; 2d, an attack of catarrh, with inflammatory sore throat, *angina tonsillaris*; 3d, *laryngitis*; 4th, an attack of catarrh, with bronchial inflammation; and 5th, an attack of peripneumony.

Excluding such accidental circumstances, however, catarrh is in general a mild disease.

The phenomena, the course of which has been now described, combined with anatomical knowledge of the parts affected, will easily explain the phenomena of this disorder. In the case of catarrh, as it ordinarily takes place, the derangement can scarcely be termed inflammation. But it may be regarded as irritation of the mucous membrane of the nose, throat, windpipe, and bronchial tubes. This irritation, which is the effect of cold applied either to the surface of the membrane or to that of the skin, affects chiefly the vessels, in which it induces congestion of blood, first diminishing and then augmenting the secretion, and finally changing its physical qualities. That it is an irritative process in the vascular system of the membrane, and probably the first stage of what might be an inflammatory process, is proved by the swelling, heat, and dryness taking place in the membrane, at the commencement, by the pain and tenderness successively referred to different regions of the membrane, by the changes which the mucous secretion undergoes, by dryness of the skin, and the sediment in the urine, and the general febrile symptoms with which the complaint is attended.

The distinguishing character of this form of tracheo-bron-

chial irritation is, that it commences at one point of the membrane, and spreads rapidly, successively, and continuously, over every part of it, without showing any tendency to affect, in ordinary circumstances, the submucous filamentous tissue, or any of the subjacent parts. In general the process commences in the nasal division of the membrane, whence it proceeds to the throat and upper part of the windpipe. As it declines in these parts, it spreads more deeply along the windpipe, and finally into more or fewer of the bronchial tubes, in which it follows the same course of growth, maturity, and decline which it observes in the nasal region of the membrane. While these phenomena show that it is a spreading and superficial process, they lead also to the inference, that it is both more rapid and extensive in action, and less violent in intensity than inflammation, from which it further differs in not giving rise to the characteristic products of that process in the mucous surfaces.

By long continuance, however, by the repeated application of the irritating cause, inducing fresh attacks, and by neglect, mismanagement, or other pieces of bad regimen, this irritative process may at length terminate in inflammation as already stated.

ETIOLOGY.—The causes of catarrh are in general cold applied to the body, either suddenly when overheated, or for a long time at once. The cold may be applied to the head, the neck, the trunk, or the extremities; and often, especially if it be applied during a considerable time, it is difficult to specify the precise manner in which it was applied. Cold or moisture applied to any part of the person during sleep is a very frequent and effectual mode of inducing catarrh. Another, not less frequent and effectual, is the exposure during our winter nights of young persons, after being overheated in large parties and crowded apartments, especially if the individuals have been dancing. A cause not uncommon is taking ice or cold fluids in the same circumstances.

The catarrh now described may prevail at any season of the year, but is most frequent during winter, at the commencement of that season, or in the spring, when the atmospheric vicissitudes are frequent and great, and when the east wind is most generally prevalent. It is chiefly sporadic, and though, from the nature of the season, numbers of cases may occur, they do not assume the epidemic character.

In certain seasons, however, catarrh prevails most extensively, and betrays, by the number of persons whom it attacks, a character decidedly epidemic. This variety of the disorder, which is called Influenza, differs from the ordinary catarrh, chiefly in the greater suddenness of its attack, in the symptoms of fever and muscular languor and weakness being in general more considerable, in those of the tracheo-bronchial membrane being more severe, in the mucous membrane of the alimentary canal, being often affected at the same time, and in some instances in its being associated with a decided rheumatic tendency.

This variety of catarrh has been believed by many to be infectious, or capable of being propagated from one individual to another, and the disease was very generally denominated contagious catarrh (*catarrhus contagiosus*.) This opinion, however, must have been adopted on very inadequate grounds, and without sufficient attention to the manner in which epidemic catarrh appears, prevails, and declines. The following circumstances show, I conceive, that the complaint, whatever be its origin and character, is not one of contagious properties.

1. Catarrh, when epidemic or prevailing extensively, is preceded by a peculiar train of atmospheric phenomena, and by winds in general blowing in a particular direction.

2. Catarrh when epidemic appears very suddenly, and affects at one and the same time great numbers of individuals,—sometimes thousands, in the course of a few days or weeks. In the spring of 1832 and 1833, it appeared in this manner, and affected at once great numbers of individuals, who could have had no communication, both in London and Edinburgh.

3. Catarrh when epidemic passes rapidly through a community, and ceases completely and entirely for that season. The catarrhal epidemics of the seasons now mentioned were completed in Edinburgh in the course of about five weeks.

4. A system of separation of the sound from the sickly seems to be quite ineffectual in the case of influenza.

While, in short, there are no reasons to believe catarrh infectious, many concur to show that it is epidemic, or dependent upon some constitution of the atmosphere and weather.

The irritative cause, which produces epidemic catarrh, appears to be one which operates much more extensively than that of sporadic catarrh. While the latter acts chiefly if not

exclusively on the rhino-tracheo-bronchial mucous membrane, the influence of the former is seen not only on that but in the gastro-enteric mucous membrane, and, I think, so far as I have observed, on the skin and the fibrous tissues and aponeurotic sheaths. Influenza is not always a tracheo-bronchial disorder. It is often one which affects the system generally, and the vascular system of all the membranes; and this I regard as the chief cause of the more intense degree of feebleness and lassitude with which it is almost invariably accompanied, and of the long tract of weakness and delicate health by which it is often followed.

The tendency of epidemic catarrh is quite similar to that of sporadic catarrh. But it is in those who have already laboured under catarrh, or in whom the bronchial membrane is weakened by repeated attacks, and therefore in the aged, very liable to induce the worst and most unmanageable forms of bronchial inflammation, that named spurious or bastard peripneumony.

A particular variety of catarrh, most prevalent in the summer months during the inflorescence of the hay crop, in certain situations, has been believed to be connected with some irritative vapour exhaled from the flowers of some of the grasses, and has therefore been distinguished by the name of Hay Fever. It is doubtful whether this idea of the origin of the disorder be well founded; and it seems quite as likely that it is produced, as other varieties of catarrh, by imprudent exposure during excessive heat. The liberties, which are often taken during extreme hot weather, are sufficient to induce catarrhal disorders, without having recourse to the assumption of a peculiar emanation.

TREATMENT.—Catarrh, whether sporadic or epidemic, is to be treated on the same general principles. In the latter case, the remedies require to be rendered more active and employed with greater energy, in proportion to the greater intensity of the symptoms, and the more general nature of the disorder.

In all cases of catarrh the first rule should be to avoid exposure to cold, and the second to adopt the antiphlogistic regimen.

So long, therefore, as the skin is too warm or irregularly heated and chilled, the pulse quickish and the cough troublesome, it is proper that the patient keep within doors, and confine his diet to the farinaceous and saccharine vegetables, with

tea, coffee, diluted milk, gruel, and similar diluent and unstimulating liquors. Attention must at the same time be given to the due and regular evacuation of the bowels; and if the tongue be furred it will be requisite to give laxative medicine until it become clean; though for this purpose it is rarely requisite to carry this to the degree of purging. With the view now specified the aloetic or compound colocynth pill, the saline infusion of senna, tamarinds, or any other demulcent laxative medicine may be exhibited in the proper dose.

In some cases in which the heat of the surface is considerable, with accelerated or accelerable pulse on rising, the patient should be confined to bed, and take the liquor of acetate of ammonia, or small does of antimonial solution, with sage tea, (*infusum salviæ officinalis*,) balm tea (*infusum melissæ officinalis*) or linseed tea (*decoctum lini usitatissimi*,) or any other diluent ptisan, so as to promote gentle sweating; and afterwards, when the cough is abated, he should return very gradually and cautiously, and only when well-clothed, to the free air.

Under this mode of treatment ordinary cases of catarrh undergo spontaneous termination in the course of eight or ten days at most; and if any cough or loss of appetite remain, they generally decline after the patient returns to the use of free air and exercise, especially gestation.

It too often happens, however, as in all mild complaints, that the patient neglects the necessary precautions, and neither consults the physician, nor subjects himself to restraints, till he finds that the disorder has, by neglect and repeated exposure, become protracted, the cough is obstinate with expectoration of opaque mucus, and there is some loss of strength, and sleeplessness, with a heavy labouring pulse a little quick. If the chest be examined at this period, though percussion be natural, the sibilous wheeze mixed with the mucous rattle is heard in various points of one or both sides. The respiration is limited, and a little accelerated, from 20 to 28 in the minute, while inspiration cannot be fully performed without exciting cough.

In this case, the irritation, which had subsisted in the rhino-tracheal division of the membrane, has become more fixed and intense in the bronchial and pulmonic division, and is indeed proceeding to inflammation. The membrane is then in an eretho-phlogistic state.

It will be proper then to adopt more decisive therapeutic measures than have been hitherto employed, not only to control the existing symptoms, but to avert the risk of serious inflammation.

Under these circumstances, it will be proper to draw blood from the arm to the extent of twelve or sixteen ounces, and repeat the evacuation if the pulse continue full and hard, the cough troublesome, with expectoration, and the skin dry and harsh. At the same time it is requisite to administer antimony in divided doses, so as to nauseate slightly, and relax the skin. In some cases of feeble patients, or those advanced in life, in whom it is deemed improper to repeat the general blood-letting, or unsafe to bleed generally at all, the removal of eight or ten ounces from the region between the shoulders will afford remarkable relief. In several cases, in which I have thought it inexpedient to employ the practice of general blood-letting, the local discharge by means of cupping I have found of the greatest benefit. Leeches may be employed with the same intention; but they are a much less powerful remedy than either general blood-letting or cupping.

After blood-letting it is of much importance to employ the revellent power of blisters, which applied either on the side where the indications show the bronchial irritation to be most intense, or on the interscapular region, are of great utility. The best place for their application in cases of doubt is the interscapular.

In cases in which the blister is considered unnecessary, a good rubefacient embrocation is a liniment consisting of equal parts of volatile oil of turpentine and *aqua ammoniae* rubbed over the chest or the affected part.

The Burgundy pitch plaster between the shoulders is useful, chiefly when all symptoms except dry cough have disappeared.

These, with the remedies above-mentioned, constitute the principal therapeutic agents indicated for removing that state of the bronchial membrane which I have called eretho-phlogistic. They will in most cases be adequate to act so far on the circulation as to remove the mere phlogistic state; but they may leave the irritative in considerable energy.

For accomplishing the latter object, the principal means are

the judicious use of opiates, demulcents, warmth in the form of the warm bath, and gestatory motion.

On the propriety of exhibiting opiates in the treatment of catarrh, some contrariety of opinion has prevailed; several maintaining that preparations containing opium are injurious in increasing heat and thirst, and checking expectoration, while others contend that these are trifling evils compared with the effectual manner in which they allay irritation, and abate the frequency of coughing. In the early stage of catarrh, while the skin is hot and dry, the tongue furred, and the thirst considerable, opiates are prejudicial, and should not be administered, as they often aggravate these symptoms, and I have seen them induce lasting weakness of the stomach. But after these symptoms have subsided, and the principal complaints are cough interrupting sleep, opiates are extremely useful in allaying irritation. They will be most safely given, however, not alone, but combined with those medicines which tend to relax the surface and promote sweating or expectoration. For this purpose five, ten, or fifteen grains of Dover's powder, or thirty minims of the solution of muriate of morphia, with an equal quantity of the antimonial solution, may be given at bed-time. With the same view, the Paregoric elixir, either according to the English formula (*Tinctura Opii Camphorata*,) or according to the Scottish (*Tinctura Opii Ammoniata*,) may be given in their respective doses with advantage. For the same purpose Willan recommends strongly, as an effectual soothing agent in recent catarrhus cough, the extract of white poppies (*extractum papaveris albi*) in a pill of five grains, given every three, four, or five hours, according to the age and constitution of the patient.

All opiate preparations have a tendency to increase thirst and heat, render the tongue furred, and impair the action of the stomach. To obviate these inconveniences, it is always desirable to alternate their use with the administration of cathartics, and either to give at bed-time two of the colocynth pills, or the next morning a drachm of the compound powder of jalap, or a dose of castor oil.

Another convenient method of obtaining a sedative effect without increase of thirst, is to give the extract or tincture of henbane (*Hyoscyamus niger*,) the former in doses of from two

to four grains, the latter of from forty minims to a drachm, at the hour of preparing for rest.

Opiates are sometimes in the treatment of catarrh advantageously combined with expectorants and demulcents; and on this principle, and with this object, all the loochs or linctuses of the older practitioners and pharmacopoeias, were composed. One which I have found very convenient consists of two ounces of syrup of squills, of mucilage and conserve of roses, each one ounce, and half a drachm of the solution of muriate of morphia; and of this mixture a teaspoonful may be taken several times daily.

Opium is also given with expectorants or demulcents in the solid form, as in the case of the opium lozenges (*trochisci glycyrrhizae cum opio*) of the Edinburgh pharmacopoeia, where purified opium is combined with tincture of tolu syrup, extract of liquorice and gum arabic, to the extent of about one grain in a drachm of the composition or seven lozenges and a half. To this form of preparation the principal objection is, that too many of these lozenges are liable to be taken, and they always increase the heat and thirst and fur on the tongue, and impair the action of the stomach in a much greater proportion than they relieve the cough. I have seen the incautious use of these lozenges induce much somnolence and thirst, and leave behind them a flatulent disorder of the stomach, with bad taste in the mouth, obstinately furred tongue and constipation, lasting for weeks.

A much safer preparation is a combination of ipecacuan, syrup and muriate of morphia, in the proportion of one grain in thirty lozenges, constituting the morphia lozenges of the shops. The ipecacuan here counteracts the sedative and parching properties of the opium; but even this requires to be used with circumspection and in moderation.

A patent medicine, Shepherd's ipecacuanha lozenges, are often employed beneficially.

I have occasionally seen much benefit result in cough persistent after catarrh, from the use of pills consisting of half a grain or a grain of ipecacuanha, and two or three grains of extract of henbane (*Hyoscyamus niger*) given twice daily.

With the same view, and upon similar principles, various other substances, partly mucilaginous and demulcent, partly balsamic and expectorant, are in popular use for the purpose of re-

lieving cough either in the course of catarrh, or persisting after the subsidence of the symptoms. Of this kind are the Tolu, Patirosa, fruit, and Jujube lozenges, which, from the quantity of sugar and gum they contain, may be regarded as soothing demulcents. The Tolu lozenge, like most balsamic substances, certainly facilitates the secretion and excretion of mucus, and occasionally induces slight and transitory sensations of squeamishness. The Patirosa lozenges, a name corrupted from *Pâte de Rose*, consist of sugar, starch, and mucilage of gum-tragacanth, flavoured with oil of rhodium and rose-water, and coloured with cochineal. They are demulcent and soothing. The fruit lozenges formed from the fruit of the black currant (*Ribes nigrum*,) contain a proportion of vegetable acid, malic, and citric, which may have some effect with the fluids taken, in relaxing the cutaneous and mucous exhalants, and detaching the mucous surfaces. The Jujube lozenges or pectoral paste (*pâte pectorale*) as it is named, ought to contain the mucilaginous and saccharine matter of the Jujube berries (*Baccæ Zizyphi vulgaris*.) But they are a factitious compound, consisting of gum arabic and sugar, in which there is almost never any of the jujube gum. The imposition is unimportant in a therapeutic point of view. None of the compositions now mentioned are entitled to the character of powerful remedies.

A class of remedies of considerable efficacy in catarrh of every degree and kind, consists in the local application of warm water either to the cutaneous or to the mucous surface. Warm water may be applied to the skin either in the form of the warm bath, or immersion of the lower extremities (*semicupium*, *pediluvium*.) The first is the most powerful remedy, often alleviating cough, abating cutaneous heat, and procuring sleep in a remarkable manner. The second form is the most convenient, and in some instances not the least successful. Both are most effectual as therapeutic agents when the disease is on the decline. The *semicupium* or *pediluvium* may be employed alternate nights, or twice in the week, while cough continues.

The vapour of warm water may be applied to the mucous surface of the throat and windpipe, by means of inhalation, with great temporary relief and ultimate benefit. For performing this operation with facility and success, the instrument contrived by Dr Mudge, and improved by Dr Hercy, or that suggested by Dr John Gairdner of this city, may be employed.

It sometimes happens, that after all the urgent symptoms of the complaint have disappeared, cough still continues to harass the patient, either when he goes from the house to the open air, or when he enters the house, or when he moves about, and, above all, during the night and towards morning. As the chest gives in this state of the cough no indication of active disease, there is every reason to believe that the tracheo-bronchial membrane is in a state of unnatural irritability. The most effectual means for allaying and removing this, next to the approach of fine mild weather and change of climate, are gestation, either in a carriage or on horseback, a sea voyage, or a slight change of air.

In this state, it is further supposed that balsamic and resinous medicines, as Tolu, Peruvian balsam, Copaiba, &c. and even myrrh, are useful in altering the action of the mucous surface. It is probable, however, that the most effectual means of accomplishing this object would be those above-mentioned, as to change of air and passive exercise, aided by great attention to diet and the regularity of the alvine evacuation. In one or two cases I have known such coughs disappear completely under the steady observance of a system of gymnastic exercise.

If, notwithstanding the diligent and judicious employment of all the means now specified, the cough continue, with expectoration of mucous matter becoming daily more dense and opaque, with short oppressed breathing, pains or weight in the chest, general weakness, quick pulse, and cutaneous heat, there is reason to believe that the disease is passing into the chronic stage; and the treatment will require to be modified accordingly.

b. *Bronchitis*; Bronchial Inflammation.

Acute bronchial inflammation differs from catarrh in being more strictly confined to the pulmonic bronchial membrane, and in presenting none of the spreading, but a fixed and stationary character of inflammatory action. It may commence its attack at least in two different modes; *1st*, either it appears first in the form of catarrh, and gradually or suddenly assumes the character of true bronchial inflammation; or, *2d*, it may appear all at once in its proper character, and without any preliminary catarrhal affection, present the symptoms of genuine acute *bronchitis*. The first mode of attack is most common, whether the catarrh has been neglected, or has been aggravated by fresh exposure to cold or humidity; the second mode is

common, where the exposure has been so complete as to induce a more violent degree of irritation than in ordinary catarrh.

a. *Tubular Bronchitis; Inflammatio Bronchorum.*

1. It is perhaps unnecessary, after the account of catarrh already given, to describe the first mode in which the disease makes its approach; and with this task I would willingly dispense, did not the history of the transition from catarrh to bronchial inflammation furnish several important pathological lessons.

I have said, that the state of the tracheo-bronchial membrane in catarrh is rather a condition of irritation than of inflammation; and it also appears that it is of a very transitory and superficial character. When this state, however, is neglected or mistreated by repeated exposure to cold, and by disregarding dietetic restraints, the irritative state, by continuance, begins to alter the physiological condition of the membrane, and to render that condition permanent which was only temporary. The external symptoms which indicate this change are not only persistence of the cough, with greater frequency and violence in its fits, but some degree of weight, oppression, and wheezing in the breathing, and some quickness in the pulse. If at this time the respiration be examined, it will be found to be from six to ten movements more in the minute than natural; and though it may not be so rapid when the patient is at rest, it is easily accelerated by motion or effort. At the same time, though the chest may sound clear upon percussion, when examined by the stethoscope, the ear detects in various points, generally on both sides, the sonorous *rhonchus* in various degrees of depth and intensity, with more or less sibilous wheezing; and in some instances the vibrations produced by the former are so strong, that they are felt by the tips of the fingers applied on the surface of the chest.

There are here two points for the physician to consider, the part of the bronchial membrane affected, and the nature of the affection. On the first point I may observe, that the symptoms now specified, taken in combination with other circumstances, show that it is chiefly in the large and middle-sized bronchial tubes that the disorder now mentioned is seated. The bronchial membrane I would distinguish physiologically and pathologically into two divisions; the first, the bronchial proper, or that lining the larger and middle-sized tubes, in short, whenever it lines tubes properly so called; the second, the pulmonic or

vesicular, or that part of the mucous membrane which lines, and indeed forms, the air-cells of the lungs. The disorder now under consideration is seated in the former or bronchial division of the membrane, and constitutes that variety which I denominate *Tubular Bronchitis*. The one presently to be considered, though it may occupy the former, is, however, principally distinguished by affecting the pulmonic or vesicular division of the membrane; and this I distinguish by the name of *Vesicular Bronchitis*. This is not the place to enter into the consideration of all the facts and arguments, by which this distinction is supported. But I may say, that after observing the phenomena and course of this disorder for many years, and after examining the state of the lungs after death, in instances in which I had opportunities of tracing the course of the symptoms during life, I have found in general the distinction now made confirmed.

With regard to the state of the membrane, that can scarcely be determined by the same evidence, as in general patients do not die under the first attacks of this form of the disorder; and if death take place, it is after the disease has repeatedly recurred, become chronic, and given rise to other changes. As in these circumstances the bronchial membrane is found red, or rather brown, rough, and swelled, with more or less contraction of the area of the bronchial tubes, while the membrane is covered by a viscid jelly-like mucus, which is often streaked with blood, or a little embrowned; it is reasonable to infer that the changes now specified are the result of the repeated recurrence of the irritative and inflammatory congestion of the first attack.

In the early stage, however, of this disorder, not much is secreted, and the membrane continues dry for several days. After the lapse of some time, either spontaneously or under the influence of remedies, this dry state subsides, and with it the sonorous *rhonchus* and sibilous wheeze, and a moist mucous rattle is heard, with more or less secretion of mucus, which is eventually coughed up and expectorated.

In this manner, and at this stage, the disease may subside without extending to the pulmonic mucous membrane, and consequently with but little expectoration.

This form of bronchial disorder I have seen take place not only after catarrh, previous to it, and along with it, but in the course of continued fever, and at the commencement, and at the

close of measles, scarlet fever, and small-pox. By frequent recurrence it is liable to induce symptoms of asthma, or to pass into chronic catarrh, with *dyspnœa*, or into dry catarrh. It then gives rise to the symptom denominated winter cough.

Tubular *bronchitis* may terminate in health by the gradual subsidence of the inflammation; in vesicular *bronchitis* by extending to the vesicular mucous membrane; in thickening of the tubular membrane and contraction of the tube, (*stenochoria bronchorum*,) causing symptoms of asthma, breathlessness, and more or less chronic cough, aggravated especially in the winter, during cold weather, and on the accession of any slight cold; in emphysema of the lungs with breathlessness; in œdema of the lungs; in serous effusion into the *pleura* (*hydro-pleura*; *hydrothorax*,) and in general dropsy.

The more formidable terminations last mentioned seldom take place until the disease has recurred several times; and as it is always liable to recur after the first attack, it necessarily renders the bronchial tubes less fit for the purpose of admitting air to the vesicles. In the bodies of those destroyed under this advanced stage of the disease the following appearances are recognized.

1. Collapse of the lungs, on opening the chest, either imperfect or none; the lungs inelastic, doughy, and gorged with venous blood; sometimes œdematous, sometimes slightly solidified.
2. The *bronchi* and large bronchial tubes containing a considerable quantity of viscid, opaque, tenacious mucus adhering firmly to the membrane; the membrane itself in the *bronchi* and large tubes reddened, rough, in some parts swelled, and of a colour more or less brown.
3. Several of the bronchial tubes present portions in which the area of their canal is more or less, sometimes considerably contracted, forming a degree of bronchial stricture.
4. Parts of the lungs, especially near their margins, present air in their filamentous tissue, and sometimes bladders of air, forming *emphysema* of the lungs.
5. In some instances a few of the bronchial tubes, especially towards the lower part of the lung, may be dilated to a greater capacity than natural.

b. Vesicular Bronchitis. *Inflammatio Vesicularum.*

2. In the second variety, either with or without the affection of the membrane of the large and middle-sized tubes, inflamma-

tion attacks the pulmonic or vesicular division of the bronchial mucous membrane.

In the latter case, after the usual sensations of shivering, weakness, and general uneasiness, the patient complains of a sense of constriction or other painful feeling in the chest; the breathing is hurried, anxious, and painful, and becomes more laborious, until it can no longer be performed easily in the horizontal posture, or with the ordinary muscular agents of respiration. The patient is obliged to assume the erect or sitting position, and to employ all the accessory muscles of respiration; the nostrils are in constant motion, and the whole countenance is anxious. Cough succeeds, but without expectoration at first, afterwards with a scanty discharge, but without much obvious relief. At the same time the pulse is full, hard, and quick, seldom under 120, often 140. The skin is hot and dry, the tongue foul, and the urine high-coloured and scanty. Such are the phenomena which attend the disease during the two first days (from thirty-six to sixty hours) of its attack. About this period a considerable change is generally observed. The breathing, which hitherto, though hurried and laborious, had still been performed in some degree, now becomes much oppressed, and is attended with wheezing, which, however, soon disappears, and is suddenly succeeded by extreme anxiety, and complete *orthopnæa*; the lips and face often become purple, the pulse becomes more frequent, but less strong and hard, the heat of the surface is diminished, the forehead and chin are moistened with cold sweats, and every sign of impending suffocation appears. At the same time, an immense quantity of yellow fluid is spit up, till the individual is no longer able to expectorate more; and while the symptoms of impeded breathing continue, with much rattling in the wind-pipe or throat, the patient expires exhausted, generally on the fifth, sixth, or seventh day. Delirium often appears during the last hours of existence.

In this description it is evident that the peculiar and prominent characters are, the constricted, laborious, and oppressed breathing without local pain, the effusion of a fluid into the bronchial tubes towards the close of the disease, a short stage of violent action, succeeded by a very short stage of languor and exhaustion depending on impending suffocation, and fatal termination at an early period. This appears to be the natural course of the disease.

In more favourable circumstances the disease does not terminate so rapidly. If appropriate remedies be early employed, the breathing becomes more easy and less rapid, the constriction of the breast is diminished or disappears, the cough is relieved, or becomes more loose, and is attended with copious expectoration of thick mucous or puriform matter. The pulse becomes less frequent, the skin becomes moist, the tongue cleaner, and the urine more copious. At this period of the disease two events may take place. Either all the symptoms may gradually subside, with disappearance of expectoration and cough, and slow but general recovery of health; or the discharge from the pulmonary membrane may continue, with cough, quick and occasionally difficult breathing, frequent pulse, wasting and general weakness. These symptoms, which indicate the chronic state of bronchial inflammation, imitate those of pulmonary consumption, and in some instances actually constitute a form of this disease, or finally pass into it.

The pathology of this disease was understood by Hoffmann, Morgagni, De Haen, Stoll, and Selle; but its nature was first explained by John Peter Frank; and it has been rendered more generally known by the researches of Chevalier, Badham, Abercrombie, and Hastings. Dissection of persons who have died in different stages of the disease have shown the bronchial membrane much reddened and highly vascular, in other instances covered with viscid puriform mucus, which completely fills the air-cells, but without adhesion of the pulmonary to the costal *pleura*, or any distinct signs of disease of the pulmonary substance. In general, when the chest is opened, the lungs do not collapse,—a proof that the cellular divisions are filled with a fluid, or at least that they are not filled with air; the tracheal membrane is in some instances reddened; and though the bronchial membrane is in general entire, in some cases small suppurated breaches of its surface are observed in various parts. This last appearance, however, is most frequent in chronic inflammation of the membrane.

These circumstances show distinctly that the disease consists in inflammation of the pulmonary bronchial membrane, which has no tendency, like the catarrhal, to resolution, but which produces a copious secretion of thick puriform mucous fluid. Unlike the catarrhal, also, it does not spread successively over different parts of the membrane, abating at one part and com-

mencing at another, but affects at the same time the entire extent of the pulmonic bronchial membrane. In this respect, in the morbid secretion which it produces, and in the rapidity of its action, it resembles much the inflammatory process of croup. I have already shown, from the dissections of Dr Home and Dr Cheyne, that the same inflammation is formed in the bronchial membrane, and the same viscid mucous or muco-purulent effusion is found in the cells of the lungs in the former disease as in the present. In some instances it appears that the tissue of the lungs is slightly affected, (Hastings, p. 185;) and we can conceive the inflammation which attacks the bronchial membrane to touch somewhat the submucous cellular tissue.

Such is a short view, semiographic and pathological, of the true acute bronchial inflammation, as it occurs in adults of ordinary strength and unbroken constitution. The disease, however, is liable to numerous modifications, which will perplex both student and practitioner, unless reduced to definite forms. I exhibit them in the following order.

1. Modification by age; *bronchitis* of childhood. *Bronchitis* of old age; bastard peripneumony; (*peripneumonia notha*) (*catarrhus senilis*.)
2. Modification by individual constitution. *Bronchitis* of feeble, relaxed, or sedentary persons; *bronchitis asthenica* of Badham, similar to the bastard peripneumony.
3. Modification by complication with other diseases; with cutaneous diseases, as rose; measles, (*catarrhus rubecularis*;) small pox, (*catarrhus variolosus*;) scarlet fever, (*catarrhus exanthematicus*;) with liver disease, with disease of the gastric or intestinal mucous membrane (*bronchitis* and *peripneumonia gastrica* and *bilio-sa* of Hildenbrand,) &c.
4. Modification by becoming chronic; chronic catarrh; catarrhal consumption; pituitous consumption.

Of these various modifications, which are described by authors, it is unnecessary to notice all.

The *bronchitis* of childhood differs not much from that of adult age, unless in its more rapid progress and speedier fatal termination. The bronchitic inflammation which occurs in the course or at the close of measles, scarlet fever, small pox, &c. is in every respect the same as the genuine acute bronchial inflammation. That which accompanies disease of the liver, or of the intestinal mucous surface, though sometimes acute, at least in commencement, is more frequently chronic, and will therefore be properly referred to that head. I shall for these reasons at present confine attention to the other two modifi-

cations; the *bronchitis* of old age, and the chronic form of the disease.

The *bronchitis* of old age and of feeble habits must be regarded in description as truly the same disease. It is not an uncommon complaint, and in autumn and spring when bronchial and pneumonic affections prevail, it is found to occur frequently among persons advanced in life, or those of full but languid habit. This circumstance early drew the attention of physicians, and there can be no doubt that it is the same malady which is mentioned by the name of bastard or spurious peripneumony (*peripneumonia notha*,) in some of the medical writings of the sixteenth century, and which is more accurately described by Sydenham. Boerhaave afterwards noticed it as a distinct disease, and described it in his aphorisms, though with circumstances somewhat different from those of the description by Sydenham. M. Lieutaud, however, confidently asserted that these authors described different diseases under the same name, and that the description of both was hypothetical. This bold assertion, the justice of which was doubted by Van Swieten, was disproved and contradicted by Cullen, who, with much attention and deliberation, verified the descriptions of Sydenham and Boerhaave by personal observation, and left a valuable and correct history of the disorder.

Bastard or spurious peripneumony is principally the disease of phlegmatic, flabby, and aged persons, often as a sequel of frequent previous attacks of catarrh or *bronchitis*, and especially of that species of asthma and winter cough which is the correspondent of chronic thickening of the membrane of the large and middle-sized tubes. It is also not uncommon in those addicted to the pleasures of the table, and particularly to those who have been habituated to the use of distilled spirits and fermented liquors.

It makes its first approach with an insidious mildness, but gradually as it advances, it betrays its presence by more evident symptoms, among which, the following are the principal. The chest is oppressed; the respiration is panting, wheezing and noisy, with sibilism and subcrepitous rattle, or fine mucous rattle, or both united; the cough is frequent, short, and obstinate, sometimes causing vomiting; the difficulty of breathing is often so considerable as to amount to *orthopnæa*; and in general the patient is obliged, from time to time, to take the erect or sitting posture. Pain in the chest is rarely felt; but

the patient has wandering pains of the trunk like those of rheumatism. The countenance is in general pale, sometimes a little bloated, and occasionally the lips and tip of the nose are livescient, and the cheeks assume a violet shade. The debility is extreme; the skin is dry, and the nights are restless; yet the patient doses and is somnolent during the day. The pulse is seldom very quick; but is generally between 80 and 90, and small and oppressed. The tongue is generally foul, and is often covered with a violet or slate-coloured moist fur. When awake the patient sometimes complains of weight and pain in the head, which are aggravated by coughing.

As the disease advances, the respiration becomes more rapid, panting and wheezing, with crepito-mucous rattling over the greater part of the chest. The face is more swelled, with livescence of the nose, lips, and cheeks. The somnolence is more deep and continuous, and sometimes alternates with delirium. Coughing becomes impracticable; the patient is unable to expectorate; and death takes place either suddenly by suffocation, or more slowly by stupor.

Much the same state of the lungs is found as in the *pulmonic bronchitis*. The whole of the vesicles are filled with frothy sero-mucous fluid; the bronchial membrane is thickened and embrowned; and sometimes old hepatization and adhesions are recognized, with *emphysema* at the margins of the lungs, and stricture of the bronchial tubes. But besides this, fluid is found effused into the ventricles of the brain, the *pleura*, and the *pericardium*. The liver is found enlarged and indurated. All the vessels of the different organs are distended with black blood.

The pathology of this disease, which appeared difficult to Dr Cullen, must be more obvious in the present day, when we have pointed out the relation between it, catarrh and acute bronchial inflammation. This physician considered it as in many cases only a catarrhal affection, in which he was certainly right; but his notion of catarrh being strictly an affection of the bronchial mucous affection only, without supposing it to be connected with inflammation of that membrane, presented to the explanation of the pathology of the disease, a difficulty which he was under the necessity of removing, by assuming a degree of pneumonic inflammation, that is, inflammation of the proper pulmonary cellular substance. That this may occur is certainly not improbable; but the history of acute *bronchitis*, and

dissections of persons who have been cut off by the bastard peripneumony, show clearly that it is not an essential part of the morbid process. We now know that the symptoms, to which physicians have given the name of bastard peripneumony, arise from subacute inflammation of the pulmonary bronchial membrane, which is slower in progress, and at first milder in symptoms than ordinary *bronchitis*, but which eventually terminates in about eight or ten days in the same mucous puriform or muco-purulent effusion of fluid into the cellular divisions of that membrane. We know that though this disease actually commences as catarrh, or appears first in the irritative, spreading form, yet, in certain subjects, when it has reached the minute bronchial divisions, it becomes there fixed, and produces the usual change in the mucous secretion and increase of its quantity. It may even penetrate to the submucous cellular tissue, in which, with other results, it may produce effusion of serous fluid. These effects, either separately or conjointly, will produce the extreme difficulty of breathing, the great languor, oppression, and even fatal suffocation remarked by authors.

From this view of the pathology, the method of treatment may be easily understood. If the fever, catarrhal, and pneumonic symptoms are considerable, blood-letting will be requisite; and in young robust or middle-aged vigorous subjects, it must be drawn to the extent of twenty or twenty-five ounces. In some instances I have found it requisite to carry it even further, and to repeat it before the cough and expectoration abated. In general, however, blood-letting ought to be moderate, and practised at different times, according to the relief which it affords; and if the symptoms are moderate, blood-letting may be omitted, or at least it should be confined to cupping between the shoulders.

In all cases the chief remedies are vomiting and blistering. Full vomiting may be frequently repeated; and small nauseating doses ought to be constantly employed.

For the former purpose, either ipecacuanha or tartrate of antimony may be employed; and the latter medicine may be best given in the dose of from four to six grains in one or two ounces of water. For the second purpose, it may be given afterwards in doses of one-eighth, one-fourth, or one-half of a grain as symptoms and effects indicate.

In some instances, after the urgent symptoms are abated, it is

important to employ a combination of squill and opium, or the ordinary squill mixture, with muriate of morphia or paregoric.

Foxglove is particularly useful after blood-letting, where the pulse continues more frequent than natural.

When the secretion from the pulmonic mucous membrane is profuse, and threatens to suffocate the patient, it is sometimes advantageous to exhibit first a large dose of tartrate of antimony, as four or six grains at once, in one or at most two ounces of water; and whether this excites vomiting or not, it generally relieves *dyspnœa*, and averts the tendency to suffocation. After this, it is of some moment, with the view of affording a slight contractile stimulus to the relaxed vessels of the pulmonic mucous membrane, to exhibit such remedies as myrrh, ammonia, or sulphate of zinc.

I must confess that I do not well understand the mode in which these remedies operate; but their beneficial effect in this stage of the disease is often undoubted. Myrrh is best given in the form of powder, or doses of from five to ten grains three times daily; or it may be made into pills of five grains of the powder, with one grain of carbonate of ammonia, to be given three or four times daily.

Ammonia is given either in powder, substance, to the extent of five grains three times daily, or in the form of *aqua ammonia*, or the camphorated spirit of ammonia, of which six drops may be given three times daily, in a solution of gum or in linseed tea.

Sulphate of zinc, which is found useful in this stage of the disease, I have generally given combined with extract of *hyoscyamus*, in the proportion of one grain of the former to two or three of the latter, twice or three times daily, according to the endurance of the stomach.

In all circumstances of bronchial inflammation, the antiphlogistic regimen is necessary, and, as a part of this, the bowels ought to be moved periodically and regularly. Purging seems to have little effect on the disease. Cold is to be guarded against; but much external heat is to be as carefully avoided.

§. XI. Chronic Catarrh or *Bronchitis*. Catarrhal Consumption. Ptituitous Consumption.

J. A. Murray, de Pithisi Ptituitosa, 1776. Apud Opusc. Vol. i. p. 277. Goettingae, 1785.

The anatomical characters of chronic inflammation of the bronchial membrane do not materially differ from those which

are remarked in the acute form of the disease. They take place, however, more slowly; the membrane, though red, villous and rough, is rarely so much thickened or rather swelled, as in the acute disease; and minute ulcers, or patches of ulceration are more common.

The effect of this action in the pulmonic mucous membrane is, to augment the quantity, and change the quality of that fluid which it secretes in the natural state; and there is reason to believe, that every derangement, however moderate, of this secretion, depends on some form or degree of inflammation. The extent to which these changes take place varies according to the severity and duration of the disease; and this gives rise to considerable variety in the characters of the fluids discharged by expectoration. At the commencement of chronic, or even acute, inflammation of the bronchial membrane, the bluish, semitransparent, and particled mucus of health is mingled with mucilaginous, transparent, and greyish fluid, not unlike white of egg, which is secreted in considerable quantity. As the morbid action goes on, however, it becomes thicker, more viscid and opaque, and generally sinks in water; and, when fully established, this thickened mucus is either mingled with, or entirely converted into a yellowish, opaque dense fluid, which cannot be distinguished from purulent matter, and which is generally more or less streaked with blood. This is the ordinary change of the secretion of the bronchial membrane when inflamed; but variations are often met with. The matter expectorated may be merely thickened mucus, very opaque, and condensed; or it may be mucus much streaked and mingled with blood.

These changes are effected without breach of continuity, or ulceration of the membrane; and it is established on unquestionable evidence, not only that purulent fluid may be expectorated, but that all the concomitant signs of consumption may occur without other change of the condition of the lungs, than the process of inflammation of the mucous membrane. De Haen ascertained, in examining the bodies of persons who, after copious expectoration of puriform or purulent matter, had died with the usual symptoms of consumption, that no ulcerated breach could be detected, either in the lungs or bronchial membrane.* The same fact was established by Dr Willan, Dr

* *Rationis Medendi*, i. xi. p. 60.

Badham, and Dr George Pearson, who examined attentively the chemical characters of the various kinds of expectorated matter, and showed that an opaque, white, or yellow fluid, equally consistent, but more tenacious than cream, is discharged from the pulmonary membrane, without breach of surface, in two different conditions of the organ, viz. in inflammation of the bronchial membrane, and in condensation or consolidation of the lungs, with watery effusion in the cavity of the pleuræ.* The fluid secreted from the inflamed pulmonary membrane may present almost every variety of colour and consistence, from thickened mucus to distinct purulent fluid, or these two substances may be combined in every proportion.

Frequently a greater or less proportion of blood is mingled with the matter excreted in chronic bronchial inflammation. The discharge of blood by expectoration has been often regarded as a disease, when it ought to have been considered as a mere symptom. In one condition only of the lung, that of chronic hemorrhagic induration, can it be considered as an individual disease; and here it might be shown to be the result of a preliminary process, consisting of local vascular congestion. In all other circumstances, however, and especially in bronchial and vesicular inflammation, it is the effect, and consequently the symptom, of a morbid process. This is the *hæmoptoe* described by nosological writers, and justly distinguished from *hæmoptysis*. It occurs so frequently in chronic bronchial inflammation, that it may almost be regarded as a symptom of the disease; and instances occur in which the only symptom is the occasional excretion of blood, or bloody mucus, for a long time, sometimes with intervals of health for years.

In these circumstances, the blood, whether pure or mingled with mucous or purulent fluid, is discharged from the bronchial membrane without destruction of tissue or rupture of vessels, or, in the language of some physiologists, is exhaled. Many facts show, that blood, in considerable quantity, may be discharged by expectoration, without rupture or ulceration of the pulmonary membrane. It is to be regarded, then, as a symptom of inflammation, appearing when this is present, and vanishing when it subsides.

The duration of this disease is various, according to circum-

* Transactions of the Royal Society, 1809, Part ii. p. 315-321. On the Qualities of Expectorated Matter, by George Pearson, M. D.

stances of constitution, treatment, and external agents in general. It is seldom shorter than three or four weeks, and it may extend to sixty days, or three or four months, with considerable change in the violence of its action and effects on the constitution. In general, however, before this time it manifests a tendency either to subside, to affect the submucous tissue of the lung, or it may terminate the existence of the patient, by the violence of its constitutional effects. That it may terminate spontaneously, especially if favoured by the co-operation of mild weather, and shelter from exciting causes, is proved by the testimony of many; but especially of Dr Badham, Willan, Broussais, and Hastings; and recovery is most certainly effected under the use of those means which are known to control inflammation.

This disease, which constitutes what has been called *catarrhal or pituitous consumption*, has frequently been distinguished by practical authors, into as many varieties as the exciting causes which are concerned in its formation; but as this subdivision is irrational, and of no practical use, it ought to be abandoned. Whether the disease succeeds to acute inflammation, or catarrh, or measles, or hemoptysis, or irritation, mechanical or chemical, or the deranged condition of dyspepsia or liver disease, or the morbid susceptibility of fever, or accompanies other morbid actions, as spitting of blood and peripneumony, it is to be regarded as the same pathological process,—as inflammation more or less violent of the pulmonary mucous membrane, and as effecting the usual derangement in the functions of this membrane. That form of it which depends on disorder of the chylopoietic viscera, described by Mr Abernethy and Dr Wilson Philip, though occasioned by a peculiar remote cause, is pathologically the same morbid action as the chronic inflammation which succeeds to measles or pneumonic disease.

The testimony of De Haen, Stoll, and Frank, shows that it forms a great proportion of consumptive cases in Germany; in Russia it appears to be frequent; it is noticed by Dr Lionel Chalmers as particularly prevalent in Carolina, and by Dr Rush in North America in general; and there is reason to believe, that the rapid cases which occur among seamen in the Mediterranean and West Indies, consist originally of this disease. It is indeed by far the most frequent of pulmonary com-

plaints, and it may be considered as certain, that, in the greater number of consumptive cases, chronic inflammation of the bronchial membrane is either the principal, or the only pathological action. It is indeed true, that it generally occasions inflammation and induration of the pulmonic tissue, before it terminates fatally; and it might be argued, that according to the evidence of morbid dissections, the disease should be regarded as chronic peripneumony; but as this is the result of the previous inflammation of the mucous membrane, I conceive it most proper to refer the disease to the present head.

Chronic bronchial inflammation may terminate in the formation of minute ulcers. This takes place chiefly in the bronchial membrane in stone-cutters, glass-grinders, needle-grinders, and leather-dressers, as in the case of those of Worcester. In such circumstances, in which the presence of mechanical irritating substances excites inflammation, succeeded by suppuration, and more or less destruction of tissue, it may be supposed that the morbid action occasioned in this manner would subside, as soon as, by its own means, it had removed the cause of its action. The cases, however, of this kind which have been recorded, show, that though recovery occasionally takes place in the early stage, it is almost never effected after distinct suppuration has occurred.

On the nature of a different form of ulcer which may occur in the bronchial membrane information is less certain. In this the membrane becomes the seat of numerous minute eminences, which, as they pass through the several stages of inflammation, suppuration, and, finally, ulceration, may be regarded as pustules of the pulmonary mucous membrane. Are these pustules inflamed follicles? This disease is not unlike what is oftentimes observed to occur in the intestinal mucous membrane, where it occasions first a modification of diarrhoea, and afterwards assumes the form of dysentery. It may be regarded as inflammation taking place simultaneously or successively, in many minute points of the membrane, and passing, after a certain time, into the suppurative stage. The ulcers thus formed are in general round or oval, rarely irregular, with their margin slightly raised, and surrounded with a red circle (*areola*), more or less distinct. The matter expectorated consists of purulent fluid, streaked with blood, and mingled with a considerable proportion of dense mucus.

In the cases of this disease from which our information is derived, death had taken place after the usual symptoms of consumption had subsisted for some time; and as it is uncertain whether, in cases which terminated in recovery, but the subjects of which had finally been destroyed by other maladies, these minute ulcers of the bronchial membrane had previously existed, the evidence as to the sanability of this sort of injury is incomplete. Medical men have in general concluded, that, when patients with hectic fever and puriform expectoration have recovered, the bronchial membrane has been simply inflamed chronically, without ulceration or breach in the pulmonary tissue. Are there recorded any cases, in which the usual symptoms of bronchial inflammation had, after some time, terminated in health, and in which, after death by another disease, many years after, the pulmonary mucous membrane had exhibited unequivocal traces of cicatrized pustular ulcers, similar to those which are observed in the intestinal mucous membrane of persons who have recovered from dysentery?

Another variety of bronchial inflammation, chiefly distinguished by the nature of its exciting cause, requires to be mentioned. I refer to that occasioned by the presence of foreign bodies in the bronchial tubes. From the account of the most authentic cases of this accident and its effects, of which I have published a detailed account elsewhere, I think the following conclusions may be established, as deserving the attention of the practitioner.

1. Foreign bodies, such as teeth, natural or artificial, pieces of metal, wood, or bones, which pass the glottis and drop into the windpipe, if they do not produce immediate suffocation, cause irritation of the windpipe, *bronchi*, and bronchial membrane, indicated by fits of coughing, more or less continued and severe, wheezing, breathlessness, and weight and oppression in the chest.

2. These symptoms of irritation are speedily succeeded by symptoms of inflammation, sometimes acute, sometimes chronic, but always afterwards becoming chronic, indicated by cough, expectoration of dense puriform or purulent mucus, occasionally streaked with blood; weight and anxiety in the chest; quick pulse; and eventually, hectic fever, with wasting.

3. These bodies, there is reason to believe from their size and shape, must be arrested in the larger or middle-sized

bronchial tubes ; and it must be anatomically and physically impossible for them to descend into the smaller tubes or the pulmonary vesicles.

4. The disease induced by their presence must therefore be, in the first instance, tubular *bronchitis* ; and though the inflammation may afterwards extend to the vesicular membrane, it is chiefly the tubular variety of the disorder throughout.

5. In all the recorded cases, the symptoms, however intense during the abode of the body in the *bronchi*, and though enduring from the space of from six to seven weeks, as in the cases of Borsieri, Dr Donaldson, and Dr J. Scott, to that of several months, as in the case by Dr Lettsom, that of Dr Nooth, and the case by Mr Howship, rapidly subsided as soon as the foreign body was ejected.

When chronic vesicular catarrh has subsisted long, the inflammatory action not only renders the membrane thick and rough, and contracts the calibre of the canals, but extends from the mucous membrane to the submucous cellular tissue, which unites the bronchial tubes and vesicles to the serous or transparent membrane of the lungs. This is the proper *cellular*, not vesicular, tissue of the organ. At first, this action produces merely redness, with vascular congestion of the submucous tissue, or what the older pathologists termed infarction of the lungs. But, as the morbid state of the blood-vessels continues or increases, lymph or lymphous fluid is effused into the interstices of this tissue ; the part loses its natural softness and elasticity ; and as the bronchial tubes and vesicles are more or less compressed by this newly deposited substance, the lung loses its sponginess and lightness, which depends on the complete permeability of its vesicles. It is found that a lung, in which this chronic inflammation of the submucous tissue has existed for some time, presents the following phenomena. *1st*, On opening the chest and admitting the air, though there are no adhesions, the lung does not collapse at all, or does so very slightly. *2d*, The pulmonic substance which surrounds a portion of chronically inflamed membrane becomes harder and denser than before, and does not float completely in water. If the induration is considerable or extensive it sinks entirely. *3d*, It loses its elasticity and compressibility, or cannot be inflated, and no longer crepitates, as in the healthy state, but resembles a portion of solid flesh.

In such circumstances, bronchial or mucous inflammation is complicated with pneumonia; and the disease becomes chronic peripneumony.

PROGNOSIS.—Chronic vesicular catarrh is not of itself necessarily fatal; and recoveries frequently take place under circumstances favourable to the abatement or disappearance of the inflammation, when merely membranous; but when it extends to the subjacent, and affects the proper pulmonic tissue, it appears to be fixed in character, and obstinate against the usual remedies.

TREATMENT.—On the proper mode of conducting the management of chronic bronchial inflammation, whether tubular or vesicular, professional opinion has varied much. The therapeutic methods suggested by theoretical principles have been by no means attended with great or even moderate success; and those which have been the offspring of empirical trials and accident, seem in several cases to have been much more favourable than would have been expected, considering the probable state of the lungs, and the usual physiological and therapeutic effects of the means employed.

It must be borne in mind that the disease is itself not very easily managed; that in most cases patients apply for assistance after it has gone on for a considerable time, and given rise to phthisical symptoms; and that, when the inflammation has spread to the pulmonic substance, produced stricture of the bronchial tubes, or otherwise injured the texture of the lungs, the chance of recovery is diminished by many degrees.

From comparison of the favourable cases given by Darwin, Beddoes, Kinglake, Magennis, Willan, Pears, Badham, and Hastings, I think the following may be regarded as the treatment best calculated to promote the favourable issue.

In cases of chronic bronchial inflammation, whether tubular or vesicular, the first object is to abate inflammation and counteract the tendency to further destruction of the tissues of the lungs.

The means best calculated to promote this object are, blood-letting, general and local, occasional emetics, antimonials, and revellents.

In most cases of chronic bronchial inflammation, it is requisite at first to detract blood from the system. But large blood-lettings are not suited to this disease. It will seldom be safe

to take more than ten or twelve ounces; and more frequently it will be requisite to perform frequent small blood-lettings, than one or two large ones. A large blood-letting is believed to impair the strength in a greater proportion than it abates the violence of the disorder. A small blood-letting, on the other hand, is believed to diminish the intensity of the disorder with less waste of the general strength.

To most cases of chronic *bronchitis*, local blood-letting, by means of cupping, is better adapted than general blood-letting; and after one general blood-letting of ten or twelve ounces, the safest plan is to draw blood from the chest by scarifying and cupping. The preferable spot may be determined by the stethoscope; but in doubtful cases, the interscapular space is well adapted for the evacuation.

In most cases of chronic bronchial inflammation, full vomiting is of great use in emptying the bronchial tubes and abating the inflammatory state of the membrane. It may be effected by ipecacuan or antimony; but if a large dose of the latter be given in a small quantity of water, it produces, without vomiting, often much more decided abatement of the symptoms than any other agent. Its effects, however, require to be watched, as it often induces extreme feebleness of the vital powers.

In most cases of chronic bronchial inflammation, nauseating doses of emetics are beneficial in abating inflammation and diminishing the profuseness of the secretion. Ipecacuan in grain doses, antimony in doses of one-fourth of a grain, and sulphate of zinc in doses of half a grain, or one grain twice or three times daily, are the most useful agents.

Revellents are necessary in this disease to determine towards the surface, and avert the blood as much as possible from the lungs. But the ordinary revellents are too transitory in their operation, and too mild in action to produce much benefit. Though blisters, therefore, may be applied, unless they are frequently repeated, they rarely make much impression on the disease. It must, nevertheless, be allowed, that Whytt completely cured, by the application of a blister between the shoulders, a case of acute bronchial inflammation which had become chronic, and in which puriform expectoration, with frequent cough and quick pulse, threatened an unfavourable result. Such effects rarely succeed the application of a single blister; and I have generally found that neither the cough was

less urgent, nor the character and amount of the expectoration changed, till several had been successively applied.

Tartrate of antimony, either in ointment, or a solution of it in camphorated spirit, produces on the surface an action which may be continued and protracted at will, according to the effects produced and the state of the symptoms. In several cases I have found the pulse come down, the cough decline, and the expectoration disappear under the sustained employment of this application. It must not be concealed, however, that other antiphlogistic remedies and dietetic measures were at the same time employed.

The most effectual revellents in cases of chronic bronchial inflammation and pituitous consumption, are those which produce suppuration of the skin and adipose tissue, as moxa, the actual cautery, caustic issues, and setons.

Moxa has been long in use as a remedy for chronic coughs among the nations of the East, and it is still found to be a revellent of considerable efficacy.

The Greek and Roman physicians were in the practice of employing the actual cautery, or *paroptesis*; and from the testimony of Coelius Aurelianus, it appears that Themison was much in the habit of ordering large ulcers externally.

In modern times the same object has been attempted by means of the caustic issue, and its efficacy was practically demonstrated by Mudge, who cured in his own person a case of obstinate catarrhal cough with puriform expectoration and hectic symptoms, by means of a caustic issue two or three inches in diameter, applied between the shoulders. The remedy was used by Dr Carmichael Smyth, is recommended by Dr W. Stark, and has been again brought forward by M. Schroeder. One decided case of recovery under its use I saw effected in the hands of my friend, Dr Stroud, now of London; but it must be mentioned, that it was employed after blood-letting and along with various other adjuvants.

The usual place for these remedies selected by English physicians is some part of the chest, and, in general, as near the seat of disorder as is practicable. In general the space between the shoulderblades is well suited for their application, because the communication here is most direct, both by means of blood-vessels, and more especially by means of the cellular tissue; and consequently the revellent action may be imagined to act

most directly on the vessels of the *bronchi* and the pulmonic mucous membrane.

By foreign physicians, however, these remedies are often applied to remote parts, as the arms, the thighs, &c. ; and sometimes there may be reasons which induce the physician to prefer these situations. On the point of their efficacy in this situation, I may mention, that I knew a gentleman who laboured for years every winter under severe and violent cough, with breathlessness and occasional expectoration, but without much quickness of pulse, and which resisted every remedy. One season, however, he was attacked with an eruption of boils over various parts of his person, but especially the trunk, hips, and thighs, and which, in the course of their suppuration, caused a good deal of suffering. After they had healed, however, the cough and breathlessness entirely disappeared, and did not again recur.

In cases of chronic bronchial inflammation in which the feet swell and the urine is scanty, foxglove is useful, and nitre with decoction of the root of dandelion (*Leontodon taraxacum*) increases the secretion of urine.

The Indian tobacco (*Lobelia inflata*), originally used by the aboriginal American Indians, and afterwards by empirics, for the relief of breathlessness, was first found by the Reverend Dr Cutler of Massachusetts to afford great relief in spasmodic asthma, and was from that circumstance recommended by him to the attention of the profession in the treatment of various pectoral ailments. It has in consequence been a good deal employed in the treatment of chronic bronchial inflammation and chronic catarrh, sometimes with benefit, occasionally without. Its physiological effects are like those of tobacco;—in small quantity, giddiness, headach, tremors, and ultimately squeamishness and vomiting. In a full dose, its leaves and capsules produce speedy and rather violent vomiting, with continued and distressing squeamishness, copious sweating, and general relaxation ; and in large doses it has produced extreme prostration, great anxiety and distress, convulsions, and death. In chronic catarrh the tincture of the leaves is most generally used ; and of this from half a drachm to a drachm or two may be given three, four, or five times daily. Its therapeutic powers are not always in this disorder very obvious. In some instances it has relieved the cough and breathlessness ; but it has

seldom alone diminished much the quantity, or changed the character of the expectoration.

A remedy much used, especially on the continent, in Germany, and Holland, for the cure of pituitous consumption, is the fine-leaved water hemlock, (*Phellandrium aquaticum*, Linn. *Ceanothe Phellandrium* of Lamarck.) Its leaves, which contain an aromatic oil, are believed to be expectorant, diuretic, and sedative. Either the leaves or the seeds may be given. The dose of the seeds in powder is five or six grains, repeated from six to ten times in the course of twenty-four hours. Their exhibition has not realized the expectations to which the accounts of the German physicians had given birth.

In the advanced stage of the disease, and in all cases in which the inflammatory symptoms have been subdued or subsided, it is sometimes of use to allow a more nutritious diet, and to exhibit various tonics.

The food should be simply sufficient to nourish without stimulating the circulation, or exciting the stomach. Even in some cases it is not improper to allow the patient to eat pretty freely, and exhibit at the same time a full dose of an emetic once or twice a-week.

The tonic remedies most safe in cases of this kind are, rhubarb powder in doses of five grains every morning and evening; compound infusion of gentian or calumbo, with about thirty drops of *aqua potassæ* in each dose; and sulphate of quinine in doses of two grains twice or three times daily, either alone or with valerian.

One of the safest tonics, however, is gestation in the open air, either on ship-board or on horseback. By the former remedy, combined probably with the antiphlogistic effect of seasickness, I have known, in several cases of chronic catarrh, the pulse fall, the cough abate rapidly, and the expectoration diminish and become less opaque. Horse exercise is less powerful, but sometimes it has proved remedial.

In general, the number of remedies increases in the inverse ratio of the sanability of the disease; and this principle is well illustrated in the therapeutic history of chronic catarrh, in which many remedies have been proposed and tried in proportion as the disease proceeds and becomes less amenable to treatment. Thus hydrocyanic acid, preparations of iodine and of iron, and the resinous balsamic medicines, or some of their

preparations, have all been proposed and tried in succession, and in general with equal want of success. The hydrocyanic acid is certainly more admissible in this disease, where the symptoms indicate much irritation, than where it is accompanied with mere relaxation. Iodine may be useful where the object is to alter the action of the bronchial membrane, and give a slight stimulus; but it is in great danger of producing mischief. The same may be said of the fumes of chlorine, which have been occasionally employed with apparent benefit in chronic cough with expectoration. Of balsamic substances the copaiba has been much commended, and tar water, and inhalation of tar vapour, which have also been represented to be beneficial, are referable to the same head.

Particular attention should be paid to diet and to clothing, and, above all, the patient should avoid exposure to cold or moisture.

§. XI. Chincough. Hooping-cough. Kink-cough. *Tussis convulsiva*, Willis. *Pertussis*, Sydenham. Cullen. *Tussis ferina*, Hoffmann. La Coqueluche; Paroxysmes Quintes. *Tussis Quintana*. Der Krampfhusten, Der Blauerhusten, Der Keichhusten, Der Stikhusten, Germ. *La Tosse Convulsiva*; *Pertosse*; *Mal del Castrone*; *la Tosse Asinina*; *Canina*; Ital. Koklusz, Pol.

Thomae Willis De Morbis Convulsivis, Caput xii. De Tusse et Asthmate Convulsiva, p. 92. Op. Om. Amstelaedami, 1682.—Et De Medicamentorum Operationibus, Cap. vi. p. 169, Nicolai Rosen et E. Nicolai Fratr. De Tussi Disp. Pars Prior. Upsal. 14 Nov. 1739. Pars Posterior Upsal. 31 Oct. 1741, Haller Disput. Med. Tom. ii. p. 53 and 71. Theodori Forbes, Disputatio de Tussi Convulsiva. Edin. 1756. Ibid. p. 99.—Observations on the Asthma and on the Hooping-cough. By John Millar, M. D. London, 1769.—A Treatise on the Kink-cough. With an Appendix, containing an account of Hemlock and its Preparations. By William Butter, M. D. London, 1773.—Animadversions on a late Treatise on the Kink-cough. To which is annexed an Essay on that Disorder. London, 1774.—Observationes circa Tussim Convulsivam annis 1775 et 1776 epidemicam. Auctore Urbano Bruun Aaskow. Act. Soc. Med. Hafn. Vol. i. Hafniae, 1777, p. 284.—Jos. Haster, Abhandlung über den Keichhusten. Landshut, 1789.—Hartmann Spicilegia ad Tussis convulsivae historiam et medendi methodum pertinentia. Francofurti, 1790.—Ferd. Gr. Danz. Versuch einer allgemeinen Geschichte des Keichhustens. Marburg, 1791.—Observations on the Hooping-cough, &c. By John Gall Jones. London, 1795.—Observations on the *Tussis Convulsiva*, &c. By J. G. Jones. London, 1798.—Macartan, Dissert. sur la Coqueluche et le Croup. Paris, 1804.—V. H. L. Paldamus, der Stikhusten, Halle, 1805.—F. Jahn über den Keichhusten. Rudolstadt, 1808.—Lando Memoria sulla Tosse Convulsiva che ha regnato epidemica in Genova nell' anno 1806. Genova, 1809.—A

Treatise on the Principal Diseases of Dublin. By Martin Tuomy, M.D. T. C. D. Dublin, 1810, p. 308.—Gallerand, Essai sur la toux convulsive des Enfans. Paris, 1812.—Clossius Etwas über d. Quelle d. Sitz d. Eigenthümlichkeiten u. Heilmethode de Keich-oder-Blauenhusten d. Kinder. Hadamar, 1813.—Treatise on the History, Nature, and Treatment of Chin-cough, &c. &c. By Robert Watt, M.D., &c. Glasgow, 1813. 8vo.—Penada Memoria cui fu aggiudicato l' *accessit* dalla Societ. Ital. dell Sc. nel 29 Novembre 1814. Verona, 1815.—Marcus Der Keichhusten, über seine Erkenntneiss, Natur, und Behandlung. Leipzig, 1816.—Kochler De sede et natura tussis Convulsivae. Praga, 1818.

Hooping-cough, or chincough, generally comes on with the ordinary symptoms of catarrh from cold, and it may preserve this character for many days. In the second week, however, or at farthest in the third, the disease betrays its peculiar nature by the characteristic symptom of a convulsive cough, in which the expiratory motions are made with unusual frequency, rapidity, and violence. When several of these forcible and convulsive expirations have been made, and most of the air in the lungs is thereby expelled, a full inspiration necessarily and suddenly follows; and the air thus drawn through the *glottis* by the gasping patient with unusual force and velocity, emits a shrill sound not unlike the crowing of a cock, which has been variously named the *kink*, *hoop* or *whoop*. This sonorous inspiration is scarcely completed, when the convulsive expirations of the cough are renewed with the same irresistible violence as before, and alternated with other gasping or crowing inspirations, till a quantity of mucus is brought up from the lungs, or the contents of the stomach are rejected by vomiting. Either of these events commonly terminates the fit of coughing for the time. When the fit is over, the patient may breathe fast and be fatigued; but in ordinary cases, children appear so little affected by it that they return immediately to play, or whatever occupation they were before engaged with. When the fit terminates in vomiting, the patient generally is seized with a strong craving for food, which he takes greedily.

The fits of coughing return at various intervals, and do not observe any exact period. They take place frequently in the course of the day, and more frequently during the night. The patient is generally conscious of their approach, and, to avoid the violent and painful concussion which the cough gives the whole person, he clings fast to any thing near, or instinctively grasps the person that holds him.

When the disease has once assumed the form now described, it may continue for a long time, generally from one month at least to three, in some instances longer, and with some variety of symptoms.

At the commencement there is either no expectoration, or a little thin mucus only is brought up; and so long as this is the case, the fits of coughing are more violent and more tedious. Afterwards, however, the expectoration becomes considerable; thick mucus, often in great quantity, is coughed up, and the fits become proportionally shorter and milder.

The violent fits of coughing frequently interrupt the free transmission of blood through the lungs, and thereby the free return of blood from the vessels of the head. This causes not only the swelling and redness or lividity of face which commonly attends the fits, but discharges of blood from the mucous surfaces of the eyes, nose, and ears.

This disease may take place without much conspicuous fever; and Sydenham says he had seldom seen it so attended. This must either be a mistake, resulting from superficial observation; or it must be understood to apply only to mild cases, and to the commencement of the disease. Cullen acknowledges that he had found it accompanied with fever, in many instances from the beginning, in more after the complaint had subsisted some time. Willan also found hooping-cough in London commence invariably with febrile symptoms (130, 154, 280,) which continue from one to three weeks. Aaskow observed febrile exacerbations every night; and sometimes an obscure exacerbation every third day. In all the cases, almost, which have fallen under my own observation, more or less fever marked by quick pulse, heat of skin, and thirst, prevailed from the first, and continued throughout the whole course of the disease. In form, it is continued with evening exacerbations and night heats. In those cases in which febrile heat and quick pulse are not observed during the day, they are always recognized during the night, when the patient becomes flushed and uneasy.

For the reasons now specified, I place hooping-cough in the present section with the irritative and inflammatory disorders of the bronchial and pulmonic mucous membrane. Hooping-cough is indeed one of the best examples of the existence of an irritative state of this membrane, in the first instance, and which subsequently, by the persistence of the irritation, may pass into

inflammation. Inflammation is not necessary to the disease, although it often takes place, and would doubtless take place oftener, but for the spontaneous vomiting induced by the fits of coughing.

Hooping-cough is generally attended with some difficulty of breathing, which not only precedes and follows the fits, but exists more or less during the intervals. When the chest is then examined by the stethoscope, it gives the ordinary signs of catarrh;—the respiratory murmur, feeble or extinct in points which otherwise sound well, puerile respiration in other points, and sometimes a slight mucous rattle, with a snorting or hissing noise, and sibilous wheeze. During the hooping-fits, the stethoscope indicates the quivering or tremulous motion communicated to the trunk by the shocks of the cough, and a little *rhonchus* or respiratory murmur during the short intervals which take place between the expulsive shocks of the cough. The prolonged gasping inspiration seems to take place altogether in the larynx and windpipe. Neither the murmur of pulmonary respiration, nor the peculiar bronchial murmur, is heard even in those parts of the lung, which some instants before and after the fit give rise to the puerile respiration.

PATHOLOGY.—The explanation of these phenomena depends upon two causes, the presence of a catarrhal inflammation of the pulmonic mucous membrane, and the occasional but temporary expulsion of air from the lungs by the violent and repeated expirations of the cough.

The existence of catarrhal disorder is admitted by Cullen (1402;) and is proved, not only by the presence of fever and dyspnœa, as already mentioned; but by the stethoscopic signs enumerated above during the intervals (Laennec;) and perhaps more than any thing by the cough, which demonstrates an irritable state of the membrane, and by the secretion of viscid mucus after the disease is fully established. This catarrhal state, therefore, is the primary cause of all the other symptoms. It produces the hoop and its effects in the following manner.

As the catarrhal congestion or inflammation goes on, it either by itself, from time to time, excites irritation, which is attempted to be removed by coughing, or by causing the secretion of viscid mucus it furnishes a foreign body, which also operates as an irritating agent, to be removed in the same manner. In the necessary efforts to expel this by coughing, the air is also expelled, not only with violence, but so repeatedly and irre-

sistibly, that the lungs are almost completely emptied of this necessary fluid. The effect of this is, that their condition at the end of a violent fit of coughing approaches very nearly to that which takes place in *asphyxia* from any of the suffocating or non-respirable gases. This gives rise to the involuntary and forcible or hooping inspiration, which is a natural effort to fill up by a fresh supply of air the vacuum made in the lungs by the repeated strong expirations of the cough. So complete, however, is this vacuum, that the air cannot be sent through the glottis in sufficient quantity, and with sufficient rapidity; and hence the gasping for breath, the crowing, and the sonorous or hooping inspiration; and hence the symptoms of approaching asphyxia in the swelled and livid aspect of the countenance from the temporary suspension of respiration. This suspension explains the stethoscopic signs above-mentioned, of the absence of pulmonary and bronchial murmur in spots of the lungs, which a few seconds before and after the fit give the puerile respiration.

This disease is generally free from danger; but as its event varies in different subjects, and under different circumstances, it is proper to mention the principal.

It is more dangerous in early infancy than afterwards. The younger children are, they are in greater danger from it; and of those to whom it proves fatal, many more are under than above two years old. Conversely, it is a very general rule, to which there are few exceptions, that the older children are, they are more secure against an unhappy termination. Lastly, children born of phthisical or asthmatic parents, and those either naturally delicate, or already much reduced by previous disease, are in great danger from the action of hooping-cough.

When the disease is fully formed, if the fits are neither frequent nor violent, if expectoration is moderate but free, and if the patient during the intervals is easy, retains his appetite, sleeps, and is without much fever or difficult breathing, the disease is free from danger; and if these circumstances become daily more favourable, it may be expected soon to terminate spontaneously.

When the disease, beginning in the form of catarrh, is attended with fever, difficult breathing, and little expectoration, it may prove fatal without assuming the form of hooping-cough. In cases of this description, however, the formation of the con-

vulsive cough and hooping, being accompanied with freer expectoration, commonly removes all danger.

Expectoration, either very scanty or very copious, especially if in the latter case the breathing is difficult, is attended with danger. Cases in which the fits terminate by vomiting, followed by keen appetite, are generally favourable. A moderate hemorrhagy from the nose is generally salutary, but copious discharges of blood are injurious.

Lastly, Hooping-cough may prove fatal from the violence of the expulsive motions of the cough inducing apoplexy, epilepsy, or asphyxia; but these accidents are very rare, and the danger, as I have already said, is nearly in proportion to the degree of fever and breathlessness attending it. It kills chiefly by the formation of vesicular *bronchitis*, and the inflammation spreading to the submucous pulmonic tissue, and causing its legitimate effects, induration or suppuration, as takes place in pneumonia. Without proving immediately fatal, it may give rise to the formation of tubercles, to chronic pleurisy, or serous effusion from the *pleura*.

MORBID ANATOMY.—The appearances found in the bodies of children destroyed under hooping-cough are the following. Serous fluid in the ventricles of the brain, with much turgidity of the veins of the organ; the windpipe containing coagulable lymph, according to Joseph Frank; the bronchial glands unusually swelled, marks of inflammation of the *bronchia*, the lungs, and the *pleura*, the latter adhering to the costal *pleura*; emphysema of the lungs; redness of the upper surface of the diaphragm; redness of the pneumogastric nerve in the cavity of the chest; the liver thrust unusually high in the thoracic cavity, and the transverse arch of the colon much dilated, with its descending portion contracted.

Of these appearances some are the effects of congestion, and some of the excessive and violent contraction of the diaphragm in coughing.

With regard to the redness of the pneumogastric pair of nerves, Autenreith states that Dr Kilian informed him that, in the bodies of fifteen children cut off by hooping-cough, he found that the neurilema of the nerve, from the spot where it forms the posterior cardiac plexus to the diaphragm, was inflamed, and that at the same time the medullary matter itself had undergone a remarkable alteration, in being of a milk blue

colour, and dense in texture, and of cartilaginous firmness. (Tubing. Blattern f. Nutur. u. Arzneykunde.) Krukenberg, (I. B. 1st.) on the other hand, states that he never found either in the pneumogastric nerve, the great sympathetic, or the phrenic nerve in children dead under hooping-cough, any morbid appearance; (Jahrbuch d. ambulatorischen Klinik zu Halle, 1820.)

The truth is, that any appearance of redness or vascularity of the neurilema or substance of any of these nerves is completely illusory, and not a decisive proof either of irritation, of congestion, or of inflammation. From the mode in which death takes place in this disease, and from the effect of coughing in interrupting the return of blood from the different organs to the lungs, it is clear that any appearance of this kind must be secondary, or the effects of the pulmonary disorder, and must have taken place only during the last few days of life.

Some years ago Dr Webster of London announced the doctrine that irritation of the brain was principally the cause of hooping-cough. (Medical Gazette.) It cannot be denied that the brain is ultimately loaded with blood not thoroughly arterialized; but it seems rather an effect than a cause of the disease.

The formation of hooping-cough in the human body depends on the application of a contagious agent, communicated, there is reason to believe, by the atmosphere as well as by contact, and affecting particularly the pulmonic mucous membrane, like epidemic catarrh (*influenza*,) and measles, and like them also prevailing in general epidemically. It affects persons in general once only in the course of life, and therefore attacks chiefly infants and children. But there are instances of it occurring not only late in life, but even, it is believed, a second time. (Heberden.) It is certain, however, that the farther persons are advanced in life, the less liable are they to be affected by the contagion of hooping-cough.

TREATMENT.—Keeping the pathology of hooping-cough in view, the principal objects in treatment would be to obviate inflammation, and to allay the severity and shorten the duration of the fits of coughing. As it depends, however, on a peculiar contagion, and always betrays an obvious tendency to run a certain course, these indications require modification.

First;—it is not in all cases necessary to obviate inflammation.

It is in general sufficient to prevent this from proceeding too far. When the disease is fully established, it has a natural tendency, by means of expectoration and coughing, to keep this process within proper bounds; and it is only when the symptoms of pulmonary oppression become manifest in great fever, difficult and oppressed breathing, and very violent cough, or inability to cough at all, that the practitioner should have recourse to prompt and decided measures to control the disease. For this purpose blood-letting from the arm to the amount of five or six ounces, if the child is above one year, or by leeches applied to the chest or upper end of the sternum, if under that age, will be found most useful. The effect of these measures may be aided by small doses of tincture of foxglove or antimonial wine, both of which possess great powers in controlling pneumonic congestion in infants. The bowels also must be kept moderately open by castor oil, calomel, or any other easy laxative. In cases of whooping-cough, with much pulmonary oppression, I have found the warm bath after the application of leeches highly beneficial.

Secondly;—in ordinary cases these active measures are not requisite. It is sufficient to watch over the symptoms, to see that pneumonic inflammation is not established, and to facilitate expectoration by the administration of suitable remedies. The phenomena of the disease itself have suggested the method to be followed; and experience proves that it is the best. When the cough is fully established, but the expectoration remains scanty and difficult, the occasional exhibition of emetics, in imitation of the spontaneous vomiting, which often terminates the fit, is found of the greatest benefit. No exact rule can be laid down for the frequency with which vomiting should be excited. In ordinary cases three times a-week will be sufficient; but in some it may be requisite to repeat the vomiting every evening. The best emetic is ipecacuan, either in substance or in the form of vinous tincture. When antimony is used it should be the antimonial wine. For infants, however, it is a troublesome medicine.

In some instances it is difficult, if not absolutely impossible, to induce vomiting; and these are supposed to be the most unmanageable cases of the disease. As it is not easy to say on what this peculiarity depends, we possess no direct means of counteracting it. If it seem to arise from inflammatory action, the proper course must be blood-letting and the application of a blister.

In one case of this kind, in which the disease was obstinate and tedious, and threatened to affect the circulation within the head, as well as the pulmonary membrane; the first favourable change was induced by the exhibition of an ounce of the oil of turpentine, which operated on the bowels in the usual manner, but at the same time was followed by great alleviation in the violence and frequency of the fits of coughing, more easy expectoration, and in a short time complete subsidence of the disease.

Friction by tartar emetic ointment has been found an efficacious revellent in whooping-cough.

The common people are in the habit of causing their children, when affected by this disease, to inhale the vapour of tar, especially when boiling; and from what is known of the effects of that agent in catarrh, there is reason to suppose that it is not altogether useless as an expectorant, and a means of allaying the irritation of the bronchial membrane. Dr Watt found it alleviate the severity of the cough in the early stage, and recommends it where fever is moderate.

Cathartics have been little employed in the treatment of whooping-cough, and for their use there is no particular indication. It is, however, indispensably necessary to keep the action of the bowels regular, by the occasional administration of any of the usual laxatives. It is proper to mention, further, that Dr Watt always found the bowels very torpid, and containing much foul fetid pitch-coloured excrement; sometimes with an excess of bile; in other cases with a deficiency, and with the stools white as in jaundice. In such circumstances, it will be necessary to exhibit calomel with jalap and colocynth, and afterwards oil of turpentine and castor oil, in order to expel the unnatural contents, to establish the healthy secretion, and to restore the natural sensibility of the intestinal mucous membrane.

With the view of alleviating the severity of the convulsive action, various remedies supposed to possess antispasmodic powers have been recommended. Thus Dr Morris recommended castor with Peruvian bark; while others have trusted to distilled oil of amber, musk, (Whytt and De Bergen,) and other strong stimulants. Neither of these medicines, however, have subsequently been found to answer expectations; though Cullen ascribes the failure of musk to the impure and adulterated state in which it is generally found in this country. Bark must

be hurtful in the early period of the disease, and throughout its whole course, until the close, when the inflammatory or congestive tendency is entirely gone. (J. A. Murray, Opusc. Vol. i. p. 307.)

A singular remedy, used in combination with bark, at one time in the treatment of whooping-cough, was cantharides. It was originally introduced by Dr Burton of York, after he found bark alone unavailing. He combined a scruple of cantharides and a scruple of camphor, with three drachms of bark; and of this mixture gave children eight or ten grains every third or fourth hour, according to the symptoms and effects, in water or julep. It was afterwards given in the form of tincture, with tincture of bark and paregoric elixir by Mr Sutcliff of Settle, and, according to the testimony of Dr Lettsom, with great success, not only in alleviating the severity and abridging the duration of the disease, but in effectually curing it without strangury or other bad consequences. Hufeland also found tincture of cantharides alone to be an excellent remedy in whooping-cough.

Narcotics have also been much employed, with the view of moderating the violence of the cough and convulsion. Extract of hemlock (*extractum conii maculati*) was much employed by Dr Butter, who relates twenty cases cured by this drug. He recommends half a grain daily to an infant under six months; one grain daily to a child from six months to two years; afterwards allowing half a grain for every year of the patient's age till twenty. For persons above that age he recommends ten grains to be given during the first day, and the dose to be increased according to the effect. This substance, however, has not been found efficacious in the hands of other practitioners; and the practice has never been much in use.

The root of nightshade (*Atropa Belladonna*) has been employed by Buchhave, Ranoe, Schaeffer, Widemann, and Wezler; but apparently with little permanent benefit.

The extract of the strong-scented lettuce, Dr Gumprecht of Hamburgh found to be very efficacious. He gave it in doses of from half a grain to two grains every two or three hours, combined with sugar, when it was followed in the course of twenty-four or forty-eight hours, with alleviation of the fits of coughing and difficult breathing, abatement of fever, and a considerable increase in the urinary discharge. (Medico-Chirurg. Trans. Vol. vi. p. 614.)

The best remedy of this class is opium and its prepara-

tions. It may be given either in the form of pill, of tincture, of Dover's powder, or in combination with antimony. The principal rule to be observed in exhibition, is not to give it if there is much fever and dyspnœa, till after blood-letting either by leeches or the lancet, not to give it till the disease is established, and the expectoration begins to be free, and to give it either after an emetic, or in combination with ipecacuan or antimony. Administered under these restrictions it facilitates expectoration, abates the severity of the cough, and moderates the violence of the hoop. Willan informs us that he found a watery solution of the drug more efficacious in effecting these ends than any other narcotic remedy.

A remedy much in popular use, which has been recommended by some physicians, and underrated by others, is change of air. There is little doubt, notwithstanding the great authorities by which it has been reprobated or ridiculed, that it has not unfrequently contributed to effect a cure. The great point is, when it is to be effectual. In the early period of the disease it is quite useless; and it is only after the febrile stage has abated somewhat, and the disease is fully established, that change of air does any good. After the hoop has subsisted for a month or six weeks, the patient should be removed from his residence to some other place; and if the cough is not greatly abated in the course of a week, he should move once more. If it still recur, in the course of ten days or two weeks, a third removal may be attempted, and the disease will in ordinary cases be then on the decline.

C. Inflammation of the Mucous Membrane of the alimentary canal from the gullet to the anus.

The term alimentary canal is employed to denote the whole tract from the mouth to the anus, through which a villous or mucous membrane extends. The first part of this mucous surface, or that which lines the facial cavities, is common to the bronchial and gastric divisions; the inflammatory diseases of it have been already noticed. Those of the second part, which is the proper gastro-enteric mucous surface, come now to be considered. Each of these resemble each other in presenting certain common characters, indicating in general an impaired or interrupted state of the digestive and nutritious function. Sickness, in greater or less degree, vomiting in some, frequent stools, and discharges of mucous, muco-purulent, or bloody matters, with griping, tenesmus, and other marks of ir-

regular intestinal action, accompanied, or speedily followed by wasting and emaciation, are the usual phenomena with which these maladies are attended.

A singular feature in the whole of these diseases is, that considerable inflammation may, and often does, exist without much effect on the pulse. In the commencement of inflammation of the mucous surface, either of the stomach or intestines, the pulse is generally quite natural; and it is only when the disease is much advanced, and the mucous, or rather sub-mucous filamentous tissue begins to be affected, that the pulse is either quick, or strong, or hard.

Another important character is the tendency which they manifest to spread successively over different points of the mucous surface, so that an inflammatory action which commences in one part of the mucous surface gradually subsides in that, while it spreads to and appears in the contiguous parts, and so on. It is not by this, however, to be understood that the proper inflammation of the gastro-enteric mucous surface is in all cases diffusive or spreading. Frequent examples occur of inflammation appearing in a point or points of this membrane, without showing any tendency to spread, and continuing to affect the various tissues in succession, from the mucous to, the peritoneal or serous membrane. Inflammation of the follicles, isolated or agminated, causing vesicles, pustules, and aphthous abrasions, are very common, especially in the lower part of this mucous surface. In short, though I deem it right to say, for the sake of beginners and others, that though inflammation of the gastro-enteric mucous surface is more generally spreading and superficial, than fixed and penetrating, yet it is evident that it is not exempt from other forms of inflammatory action, examples of which are more frequent in other tissues.

As in other regions of the mucous surfaces, inflammatory action may be developed in any one point, and spread to any other, or continue stationary; so that the nosologist may enumerate different inflammations, according to the situation of the morbid process. It has, however, been found convenient to refer them all to one or other of the following general heads.

Inflammation of the mucous surface of the œsophagus, *Œsophagia*; of the stomach, *Gasteria*; of the ileum, *Enteria*; of the colon, *Colonia*.

§. XII. Inflammation of the *Œsophagus*, *Œsophagia*; *Eso-*

phagitis. Entzündung Des Rachens und des Schlundes. *Dysphagia a phlegmasiis*, Sauvages. *Dysphagia inflammatoria*, Schmalz. Morbus œsophagi inflammatorius, Honkoop.

N. Honkoop de Morbo Œsophagi Inflammatorio, Lug. Bat 1774.—De Dysphagia Commentatio Pathologica, Auctore Gustavo Kunze, Med. Doct. Lipsiae, 1820.

Primary inflammation of the œsophagus or its mucous membrane, is doubtless a rare disease; and perhaps the membrane is never inflamed idiopathically, or without the application of some mechanical or chemical irritant. Riedel, Morgagni, and many subsequent observers, have seen its mucous membrane reddened in hydrophobia, and have therefore inferred the existence of inflammation. But it seems doubtful from subsequent inquiries, whether this be not simple irritation, or the effect of the state of the vascular system generally, during the latter hours of existence, or in some cases a cadaveric change.

It has been repeatedly found inflamed after the introduction, accidental or intentional, of any of the irritants, as sulphuric or nitric acid, hydrochlorate of tin, bichloride of mercury, caustic potass, hellebore, and similar substances; and it has also been found partially inflamed from the irritation of foreign bodies sticking in it, as fish bones, or from forcible and repeated attempts to extract these bodies. (Howship.)

We have also seen that the œsophageal mucous membrane is very liable to be inflamed in the diphtheral or malignant *angina*, by the extension of the pharyngeal inflammation down the *œsophagus*, and generally with the production of the viscid opaque incrustation by which that distemper is distinguished.

The œsophagus, from possessing an epidermis, is also liable to the vesicular inflammation which takes place in Thrush; and it indeed appears that oftentimes this inflammation may spread some distance along the œsophageal canal.

Notwithstanding the justice of the arguments now adduced, Reil, the Professor of Medicine at Halle, contended for the importance of œsophageal inflammation as a primary disease. But as he has not adduced any examples of this inflammation, except the disease now mentioned, viz. malignant *angina*, it does not appear to me that he has established his point. The example of Reil has, however, been followed by Conradi and Richter, and at a much later period by Gustavus Kunze in a

learned dissertation on Dysphagia. As I have not seen the primary or idiopathic form of œsophageal inflammation, I describe the disease from the latter author.

Inflammation of the œsophagus is indicated by very intense fixed pain felt in the course of the canal, and referred principally to its dorsal region, greatly aggravated by efforts at deglutition even of the mildest alimentary articles, by the supine position, and by a deep inspiration. The pain is at the same time pungent, and it is often so violent that deglutition is often completely impeded, and the *ingesta* are convulsively rejected through the mouth and nostrils. If to these symptoms are associated the other marks of inflammation, viz. swelling, heat, headach, fever, with a very hard pulse, and suppression of the secretions, it may be inferred that the *œsophagus* is in a state of inflammation.

Suppression of the secretions is also observed in the *œsophagus* itself, so that the delicate excretory ducts of the muciparous glands do not excrete the fluid with which in the sound state the surface of the canal is constantly lubricated; and hence the tube is dry, and deglutition is rendered still more difficult and painful.

The course of œsophageal inflammation varies as the disease is acute or chronic. In the acute form it is generally completed in four days, as it either terminates in resolution, or disappears, according to Kunze, by metastasis. If this do not take place, it then proceeds to suppuration or ulceration, and to induration. The latter, however, is a more frequent result of chronic or latent inflammation of the œsophagus.

The termination in gangrene has been said to be observed chiefly after the introduction of the irritant poisons; and the authority of Morgagni, Wilmer, and Taranget, has been adduced in proof of the justice of the statement. It may be doubted, however, whether the observers were perfectly aware of the fallacies to which this inquiry is liable; and in general they appear to have admitted as gangrenous any dark-coloured patches which the œsophageal membrane presented. Some of these patches were evidently extravasated blood, and others were blood chemically blackened by the substances swallowed; but whether they were gangrenous is doubtful.

Even the corrosion produced by the mineral acids does not appear to be the same with gangrene.

If there be pain in the course of the tube, and difficult deglutition or regurgitation of food or drink, the proper course is to adopt the antiphlogistic treatment in all its divisions.

§ XIII. *Gasteria. Gastritis erythemoidea.* Cullen.

Fr. Hoffmann, Diss. de Inflammatione ventriculi frequentissima. Halae, 1706. Op. Om. Tom. vi. p. 223.—De Haen, Ratio. Medendi. Part vi. p. 263. Part ix. p. 64, 119. Part xiv. p. 105, 130, 132.—Hennings Beschreibung der Kennzeichen und Cur der Entzündung des Magens und der Gedarme. Kopenhagen, 1781.—The successful cure of a severe disorder of the Stomach by milk taken in small quantities at once. By the late Will. Hunter, M. D., &c. Read 28th July 1783. Med. Observations and Inquiries, Vol. vi. p. 310. London, 1784.—Three instances of sudden death, with the appearances on Dissection. By James Carmichael Smyth, M. D. Case I. Medical Communications, Vol. ii. p. 467. London, 1790.—Kretschmar de Gastritide cum historia gastro-hepatitidis occultae, post mortem detectae. Erford, 1795.—Des Perforations Spontanées de l'Estomac. Par M. Alexandre Gerard, D. M. &c. Paris, 1803.—Observations on the vascular appearance in the human stomach which is frequently mistaken for inflammation of that organ. By John Yelloly, M. D., Physician to the London Hospital. Lond. Medico-Chirurgical Transactions, Vol. iv. p. 371. London, 1813.—Rupture of the Stomach and escape of its contents into the Cavity of the Abdomen. By John Crampton, M. D. With Additional Observations. By Benjamin Travers, Esq., F. R. S. Lond. Medico-Chirurg. Transact. Vol. viii. p. 228 and 271. Lond. 1817.—Contribution to the Pathology of the Stomach, &c. By John Abercrombie, M. D. Ed. Med. and Surg. Journal, Vol. xxi. p. 1. Ed. 1824.—De la Membrane Muqueuse Gastro-intestinale dans l'état sain et dans l'état inflammatoire; ou Recherches d'anatomie pathologique sur les divers aspect sains et morbides que peuvent presenter l'Estomac et les Intestins. Par C. Billard. A Paris, 1825.—Mémoires ou Recherches Anatomico-pathologiques sur Diverses Maladies. Par P. Ch. A. Louis, D. M. &c. Paris, 1826.—Case of Ulceration and Rupture of the Stomach. By John Elliotson, M. D., &c. Lond. Medico-Chirurg. Trans. Vol. xiii. p. 26. Lond. 1827.—Three cases of Ulcerative Destruction of the coats of the Stomach. By David Craigie, M. D. Edin. Medico-Chir. Trans. in Ed. Med. and Surg. Journal, Vol. xlv. p. 262. Ed. 1835.

Though the mucous membrane of the stomach be liable to irritation, and perhaps to inflammation, in the course of ague, remittent fever, continued fever, typhous fever, and some other diseases, yet it has been doubted whether the idiopathic inflammation of that tissue, exclusive of those cases in which an irritant or corrosive poison is introduced, be a common occurrence. Hoffmann, indeed, maintains that it was a very common disorder; but this statement he appears to have made without much careful examination of the evidence for or against the point. The subject is indeed one which is involved in great obscurity and beset with peculiar difficulties, from causes which, though now better known than formerly, cannot be said to be perfectly understood.

In order to establish the existence in any given case of inflammation of the mucous membrane of the stomach, two sorts of evidence are requisite. The first is, that of the existence during life of those symptoms which are known to distinguish unequivocal cases of gastric mucous inflammation, such as pain in the region of the stomach, aggravated by taking food or drink, sickness, with the rejection of ingesta, pain at the epigastric region, aggravated by pressure, thirst, furred tongue, and more or less fever. The second species of evidence is that of the anatomical characters discovered by inspection after death, in cases in which more or fewer of the symptoms already specified have been observed during life.

In the application of the criteria now mentioned, various difficulties are encountered. In the *first* place, in various cases in which the symptoms believed to indicate inflammation of the stomach took place, they gradually subsided, and it became impossible to obtain the requisite evidence. In the *second* place, in many instances physicians and anatomists have observed in the mucous membrane of the stomach after death appearances of redness in various degrees, which were ascribed to inflammation; yet in which there appeared during life no symptoms indicative of any uneasy sensations or derangement of function in the stomach.

De Haen and Stoll adduce examples of redness and vascularity in the mucous membrane of the stomach in cases in which no indications of inflammation of the organ during life had existed. From the time of these observers to the present, the same fact has been so often verified that no doubt can be entertained of its accuracy. It comes then to be a question, are these appearances of redness and vascularity in the mucous membrane of the stomach characters of inflammation, and if they be not, what is their origin, what are the true characters of inflammation, and in what respect are they to be distinguished from the true characters?

I. For the resolution of this important question, the pathologist is first and chiefly indebted to the researches of Dr Yelloly who showed, from the examination of the stomach in twenty cases of death taking place in a number of diseases and accidents very different from each other,* and in five cases in

* Apoplexy, convulsions, tetanus, fever, pleurisy, consumption, diseased heart, dropsy, ulcer of the leg, compound fractures, and amputations.

which the mode of death was by suspension by the neck, that the vascular and reddened appearance was nearly the same in all, and arrived at conclusions which may be shortly stated in the following manner.

1. It appears, in the *first* place, that the marks of vascular redness and injection, whether bright or dark-coloured, in distinct vessels, or in patches of extravasation various in size, may occur in the gastric mucous membrane quite independently of any disease in that membrane. These patches occur in every variety of degree and form, in persons who have laboured under the most different diseases, and in circumstances in which the stomach might be expected to be in the most healthy state. They are found in every part of the stomach, but principally in the posterior part of the great end, and in the course of the small arch, and they occupy spaces various in extent, but are generally well defined, and terminate abruptly.

2. The appearances now specified are, Dr Yelloly thinks, a fair average specimen of the state of the gastric mucous membrane in the human adult. In young subjects he is inclined to think the appearance of vascular redness is less intense, less conspicuous, and less frequent; as in the case of two boys, in one the stomach presented only a very obscure portion of redness, and in the other it showed none.

It may be proper, nevertheless, to remark, that this point is liable to some variation, chiefly, I presume, from the circumstance of food being or not in contact with the villous surface of the stomach previous to, or at the time of, death, and also according to the nature of the alimentary substance contained in the stomach at that time. In the stomach of a boy of 12, who died of symptoms of continued fever in the Fever-ward of the Royal Infirmary on the 8th of December 1834, and who had drank a considerable quantity of milk for two days previous to the fatal event, I found a globular mass of curd as large as a good sized pippin in the great *cul de sac*, and the villous membrane of the organ all round of a bright red crimson colour, which endured for several days after death. In this case it appears to me that the bright crimson colour, which depended on very delicate and minute injection of the vessels of the villous membrane, was the effect of the irritation of the curd exciting the stomach in a languid state to digestion, and therefore act-

ing as an irritant. Analogous cases are detailed by Billard, (27th.)

3. The appearances observed in the gastric villous membrane in the circumstances now specified, remain in their original distinctness for a short time only, being most conspicuous on the first day, and afterwards, though at irregular periods, becoming indistinct.

In this evanescent process, the vascular redness becomes first dark, then purple, and at length gradually disappears.

4. This redness, which is either stellated or arborescent, or both, Dr Yelloly always traced to the injection of very minute veins, derived from a venous net-work situate between the villous and the muscular coat of the stomach. The proofs of the inference are the following.

a. An appearance very similar to the red vascularity specified, is easily produced by injecting the veins when they contain little blood with red-coloured injection, after which the villous coat to the naked eye, and more distinctly by means of a magnifying glass, presents an arborescent or stellated form of vessels, exactly similar to those seen in the cases specified. If the veins when injected contain blood, the blood is forced into more remote branches, and at length escapes by rupture.

b. The same red vascularity may be completely imitated by forcing back by the finger, or the back of the scalpel, the blood contained in the large venous branches into the small veins, in which minute injection of the vessels of the villous coat takes place. This may be effected without extravasation, especially when the coats are thin.

c. The arteries in all these cases are either completely or nearly empty.

5. The appearances now mentioned, which are observed in the case of natural death from various diseases, are merely a slighter and less intense form of a very general red, or rather dark red vascularity of the human stomach, in cases in which death is suddenly and violently produced by suspension or strangulation, which are principally distinguished by greater intensity and more general diffusion of the vascular redness, with a tendency to extravasation from the extremities of the vessels, on the surface and within the cavity of the stomach.

6. From all the facts now specified, combined, and compared, it results that the vascular redness often observed in the

gastric villous membrane of persons dead of different diseases, though it take place during life, cannot be regarded as an evidence or an example of inflammation. There is good reason to believe that it takes place during the latter hours of life; and as it is seated wholly in venous capillaries, while the arteries contain little or no blood, there is reason to infer that its presence, its extent, and its degree, depend upon the mode in which the circulation is carried on during the latter hours of existence.

Of the precise manner in which this passive vascular congestion is effected, Dr Yelloly speaks with great and becoming caution; but he conjectures that the arteries possess a power of conveying the blood to the capillaries, independently of the heart, after the supply from the latter organ ceases, and thence to the veins, and that thus there takes place in these vessels a species of accumulation, upon which depend the appearances recognized. He allows also, that the obvious cause of accumulation in the veins, which acts in death by suspension, may also operate in a smaller degree in ordinary death; but he thinks that the striking vascularity observed in the gastric villous membrane after death is chiefly owing to the peculiar laxity of the membrane itself, and to the great number of blood-vessels with which the organ is supplied.

To the influence of obstruction to the venous circulation at the right side of the heart, I am inclined to attach greater importance than even Dr Yelloly does, in explaining the appearances now mentioned,—from the fact, that the intensity of the vascular coloration in the class of cases now referred to, very uniformly presents a direct ratio to the degree in which the motion of the venous blood is impeded.

Thus in cases in which death is preceded by painful agony and breathlessness, either of long or of short duration, the coloration of the gastric villous membrane is not only more general and more intense, but it is of deeper tint, and in some instances it is purple or violet. Of this, daily instances are observed in hospital practice; but a very well marked example occurred in the course of last winter in the Clinical Ward of the Royal Infirmary. A man who was labouring under the symptoms of diseased heart, with those of effusion within the cavities of the *pleura*, the *pericardium*, and *peritoneum*, and lividity of the countenance, was attacked with great breathlessness, preventing the horizontal position, and after an agonizing

struggle of ten or twelve hours, became comatose and died. After death the stomach was found of a deep red-colour, and its villous membrane was almost violet, with great injection of the *villi* and *rugæ*, with dark-coloured blood. In this case, the whole of the organs almost presented more or less of the same livid or violet tint; and the *venæ cavæ*, and the right chambers of the heart, were loaded with modena-coloured blood, semi-fluid, and in clots.

The phenomena of cases similar to this, with knowledge of the anatomical arrangement of the organs of circulation, and the actual course of the blood from the right to the left chambers of the heart, appear to me to afford a satisfactory explanation of the venous injection of the stomach, without having recourse to the supposition of the arteries possessing the power of propelling the blood into the capillaries. Where the process of dying either commences or takes place by the lungs, it is clear that the first effect of the impeded action of these organs must be evinced in the circulation through the pulmonary artery, the blood in which is first retarded, and then eventually arrested. The next effect of this is distension of the right ventricle and right auricle, and then of the superior and inferior *cavæ*, and the coronary vein in the order specified. As the left ventricle, however, continues to propel whatever blood it receives from the left auricle and the pulmonary veins, this is propelled into the arteries and their minute ramifications, until no more being received from the pulmonary veins, by reason of the progressively increasing interruption of the circulation through the lungs, the whole sent is conveyed into the arteries, leaving the left ventricle and large arteries comparatively empty. The elasticity and contractility of the arteries in the meantime are quite adequate to propel to their ultimate extremities, and even into the capillaries and veins, the small quantity of blood conveyed into them by the left ventricle. Meanwhile, as the impediment to the lungs increases and attains an extreme degree, the accumulation of blood in the venous system also increases, until, instead of the blood being moved in the direction from the branches to the trunks, it first stops in the latter, and then is reflux from them into the former, injecting in this manner the minute veins of all the organs, but especially those of the stomach, from the causes already assigned by Dr Yelloly. It is easy to see that the congestion

of the veins, and the emptiness of the arteries, are connate effects of the same cause.

It thus appears that the vascular injection of the villous membrane of the stomach is altogether the result of impeded venous circulation, or a passive state, which, however similar to the vascular redness of inflammation, is nevertheless widely different from that state in its cause, in its anatomical situation, and in its physiological characters. As it merely imitates inflammation, it may be called a pseudo-inflammatory or *phlegmasioid* redness and vascularity. It is more justly entitled to the character of *hyperaemia*, than any of the states to which that epithet has been applied. It may be denominated *phlebotaxis*.

There remain still to be noticed other two states very similar, if not the same, in which the villous membrane of the human stomach may present a high degree of red vascularity. One is in cases in which death has taken place some time after opium or any of its preparations have been taken, not necessarily in an over-dose, but merely while the immediate effect of the drug is still operating on the stomach or its circulation. In several cases of this kind, but in one especially, I have observed the gastric villous membrane extensively reddened. In that to which I especially allude, in which the individual died from renal dropsy, and the kidneys presented complete tubercular irregularity on the surface, with yellow degeneration of the cortical texture, upon inspecting the stomach thirty-six hours after death, the whole of the mucous membrane was generally reddened in minute *punctula*, but that of the rugæ was particularly bright-coloured. No unusual symptoms indicating gastric disorder had in this case preceded death; and though the patient was accustomed to take laudanum, and, if I am not misinformed, spirituous liquors, she had got the night before death took place, a draught containing only fifty drops and some sulphuric ether.

Similar appearances are not unusually observed in the cases of persons who have, previously to death, drank large quantities of ardent spirits. Among others, a remarkable case of this kind, which fell under my observation in the course of last winter, deserves mention.

A female, aged 46, the keeper of a disreputable house, who was in the habit of drinking spirits, diluted and undiluted,

pretty freely, was in her usual health on the evening of the 8th of December 1835; and as the house was filled with visitors, she drank more or less with each, and, though heated and flustered, still retained her presence of mind and consciousness, till past eleven. About this time or soon after, she was observed to drink at one or two draughts from a common tumbler, a quantity of undiluted spirits, which had nearly filled the glass. Soon after she became drowsy, but found her way to her own chamber, and lay down on a sofa, where she soon fell into a state which was regarded by the other inmates of the house as sleep; and as this was not unusual, no apprehension was entertained. She lay in the same position till next morning, when she was found between nine and ten, stiff and cold. A medical person then summoned informed them that she was dead.

As the terms, on which she lived with a person reputed to be her husband, were not amicable, and as from the character of the house, suspicions were excited as to the mode and cause of death, Mr Watson and I were requested by the Sheriff to inspect the body.

Much serous fluid was found in the subarachnoid tissue, and in the ventricles of the brain, and in the spinal theca. The convolutions of the brain were flattened and atrophied. The lungs were gorged with dark-coloured blood; the bronchial membrane was reddened, swelled, and rough; and bloody serum was found within the *pleura*. The stomach was filled with fluid smelling strongly of spirit. The *rugæ* were distinct and large; their mucous membrane very much reddened in points, and that of the stomach generally was of a crimson red-colour, and very vascular.

In this case, it is very probable that the impeded circulation through the lungs, as well as the presence of spirit in the stomach, might have contributed to give the villous membrane of that organ its crimson coloration. Death from an over-dose of spirituous liquor operates not only on the brain, but on the lungs, rendering the circulation slow, and the respiration rapid and laborious, with livid swelling of the extremities, till it terminates in complete stagnation.

Though the researches of Dr Yelloly have been completely overlooked by foreign pathologists, their general accuracy has been confirmed by the subsequent inquiries of Billard, Rigot and Trousseau and Louis. Though the first of these authors

has described minutely the different forms which the phlegmasioid red vascularity assumes, as distinguished into ramiform, capilliform, punctulated, striated, laminated, or patch-like and diffuse, and all have attempted to distinguish the pseudo-inflammatory from the genuine, they have not added materially to the sum of accurate knowledge; and the principal mark of distinction which they have given is derived from the influence of gravitation and position. This circumstance, indeed, with the effects of inflammation, are the chief marks on which the pathologist is taught to rely for distinguishing phlegmasioid from inflammatory redness and vascularity. I shall endeavour to enumerate these marks as shortly and as clearly as the subject, which is both obscure and complicated, will admit.

1. Inflammatory redness and vascularity are distinguished from those which are phlegmasioid by being indiscriminately in an elevated or dependent part of the stomach, in relation to the position of its reducent veins. Phlegmasioid redness, though it may be in an elevated portion of the membrane, is, however, very generally, nay, almost always, in a dependent part.

2. Inflammatory redness and vascularity depend on injection of the minute arteries as much as on that of the veins, and are accompanied with more or less fulness and distension of the arterial system of the stomach; but sometimes they are entirely local, or restricted to a minute patch or patches of the stomach. Phlegmasioid redness depends exclusively on fulness of the veins, which extends over the abdominal organs generally; the arteries being always empty.

3. Inflammatory redness and vascularity may or may not be attended with thickening of the villous coat, according to the stage of the process. If the lesion be of short duration previous to the fatal event, little or no thickening may be perceptible. If the lesion proceed more slowly, or if life be protracted, the villous membrane is always more or less thickened.

4. The most constant change in the villous membrane, however, is a rough state of the mucous surface of the villous membrane, in consequence of which the mucus, which becomes very viscid and opaque, adheres most tenaciously to the surface of the stomach, and is removed with very great difficulty.

5. There is reason to believe that if cases of gastric mucous

inflammation could be examined at a period sufficiently early after the developement of the disorder, the membrane would be found dry. But in all cases in which it has been seen hitherto, it has been found more or less covered with viscid opaque mucus, sometimes a little tinged with blood.

6. Another very constant change in the physical characters of the villous membrane of the stomach, which is an effect of inflammation, is more or less friability in the membrane, and loosening of its connection with the subjacent tissues, in consequence of which large shreds of it may be peeled off. In stomachs with pseudo-inflammatory redness, the mucous tissue is in this respect unaltered; and only minute shreds may be peeled off, as in the healthy state.

7. It has been often stated as a question, whether inflammatory redness disappeared after death, or was persistent. From the researches of Billard, it appears that the inflammatory redness of the gastric villous membrane ought not to disappear at the moment of death, so early as those of the external surface of the body. But in cases in which this redness and vascularity may not be recognized, if there be other changes in the physical and anatomical characters of the membrane, which are known to be the effect of inflammation, then it may be inferred that it must have disappeared, or, in other words, must have existed in the membrane, though no longer cognizable. If in doubtful cases redness continue for twenty-four or thirty-six hours after immersion in water, it must be regarded as the result of chronic inflammation.

8. By far the most common of the forms of redness connected with inflammation, is that of redness in patches, variable in size, more or less numerous, generally with, sometimes without, evident tumefaction of the mucous tissue, often with roughening of the villous surface, and always with the excretion of viscid adherent mucus.

9. When the redness is diffuse, it is the result of intense inflammation, and it is accompanied with thickening and friability of the mucous tissue, and an augmented excretion of thick, opaque, almost puriform mucus. This form of redness is often accompanied with erosions and ulcerated patches.

10. Besides the red coloration, the gastric, and especially the intestinal mucous membrane are subject to other varieties in change of colour connected with inflammation. The principal

of these are the brown and violet coloration, marbling of the villous membrane, and slaty coloration.

Brown or violet coloration is an effect, and an evidence of chronic inflammation, or acute or subacute inflammation which has become chronic. The brown coloration with a violet shade is observed with thickening or softening of the mucous tissue. In general the more deep the brown tint is, it is reasonable to conclude that the more prolonged and intense must have been the inflammatory process.

Marbling of the villous membrane consists in a number of reddish, brownish, or violet-coloured lines, being scattered over a gray ground, intersecting each other in different modes, and at different intervals, and giving the membrane a party-coloured or variegated aspect. This is almost invariably an effect of chronic gastric inflammation. It is very often associated with softening and friability of the villous membrane, which is easily detached in large shreds.

The gastric villous membrane presents a slaty gray colour in points, spots, or streaks extending uniformly, chiefly in cases of long-continued chronic inflammation.

11. The changes in texture are infiltration of air (*emphysema*,) infiltration of serous fluid (*œdema*,) the fungous appearance of the membrane, hypertrophy, attenuation or atrophy, softening, enlargement of the mucous follicles, and erosion or ulceration either of the membrane or its follicles. As these are rather effects than characters of the inflammatory process, I shall not dwell on them.

Of these several changes, the most important circumstance is, that in some of them, but especially that denominated the fungous aspect, which consists of prominent elevations of the membrane, soft, thickened, and liable to bleed, an albuminous exudation, constituting a false membrane, is liable to be secreted. Such productions have been observed by Baillie, Broussais, Rullier, Guersent, the younger Andral, Breschet, Denis, Billard, Godman, and Velpeau. It is necessary also to observe, that the presence of such albuminous products is almost invariably connected with a vivid red colour of the subjacent membrane, and other marks of intense inflammation.*

* It may here be mentioned, as a proof of the inaccurate manner in which statements of facts are sometimes made, that some person who reports the observation of Dr Godman in the Archives, adds, that a similar false membrane was found by

II. I come now to the second part of this inquiry, namely, to determine if there be constant symptoms, by which we can recognize during life any of the varieties of change now specified. In other words, what are the symptoms to which the presence of the changes now specified gives rise.

It appears, from what has been already said, that the researches of Dr Yelloly enable us to explain the appearances remarked by Hoffmann, De Haen, Stoll, and Morgagni, and to answer the question why these appearances were recognized after death, without having given any trace of their presence during life by characteristic symptoms. The appearances remarked by these observers were not connected with inflammation, were entirely illusory, and were altogether phlegmasioid. With the other appearances already distinguished from these, it is different. They are attended by symptoms, though the symptoms are liable, under certain circumstances, to be modified and obscured.

Acute inflammation of the gastric mucous membrane is, upon the whole, not a frequent disease. But chronic inflammation of that organ is much more common. From the history of various cases recorded by different authors, but especially from those recorded by Billard, it is impossible to doubt that the disease may occur under three different forms.

a. The first of these is when it induces more or fewer of those symptoms, which by nosologists have been assembled under the general and comprehensive appellation of *dyspepsia*. Feelings of squeamishness, sickness, and loathing of food, sometimes faintness, uneasiness in the epigastric region, not unfrequently pain of an aching, gnawing, tearing, or raking character, as it is expressed by the patients themselves; weight in the epigastric region; occasionally vomiting, if food be taken, either excessive in quantity or irritating in quality; furred tongue; thirst, especially during the night and towards morning; and dry skin, are all symptoms which indicate an evident disorder of the gastric mucous membrane.

The disorder, nevertheless, does not in this state amount to inflammation. It is still in the form of irritation of the gastric villous membrane, or that state of undue and preternatural ex-

Mr Howship in a case of fatal gastric inflammation produced by swallowing boiling water. It is expressly stated by Mr Howship in that case, that no false membrane was found.

citement of the membrane and its vessels, which is generally, if not invariably, the consequence of tasking the organ beyond its natural powers. When we consider the frequent excessive mechanical distension to which the gastric villous membrane is subjected,—the frequent, if not the daily changes from a state of collapse and contraction to one of extreme plenitude and distension, often impeding the circulation of the organ, if not that of all the neighbouring vessels,—and the frequent physiological irritations applied to its villous surface in the way of insoluble, indigestible, and stimulating food, and exciting vinous or spirituous liquors, it must cease to be wonderful, that a tissue so often irritated may at length be thrown into a form of habitual irritation, which may pass by continuance into inflammation. The sensations produced in this irritative state are often attempted to be relieved or rather stifled by the use of vinous or spirituous liquors; and occasionally by opium or ether; but the effect of these agents is rather to suspend for a little the communication between the affected organ and the *sensorium*, than to allay the irritation of the over-excited membrane.

b. The transition of the irritative into the inflammatory stage is denoted by the symptoms of disordered digestion, being more continuous and unremitting in duration, and more violent in degree. They are then associated with frequent vomiting of *ingesta*, pain in some part of the epigastric region, dry skin, red smooth glossy tongue, and considerable wasting of the flesh and loss of strength. The pulse is not always quicker than natural; generally, indeed, it remains unaccelerated, but is small and oppressed. The pain of the epigastric region is sometimes slight, sometimes more severe and enduring, and in general it is aggravated by pressure.

Of this form of the disease examples are not unfrequent; but they are too often regarded as mere dyspeptic cases, and are treated accordingly, always without benefit, and sometimes with great and irreparable injury.

The best example of inflammation of the villous membrane of the stomach for illustrating the symptoms and effects of the process, is given by Dr William Hunter; and as, notwithstanding its importance, it appears to have been altogether neglected by all the authors who have treated of this disorder, I think a short abstract of it may be instructive.

A gentleman brought his son, a boy about 8 or 9 years old,

for advice to Dr Hunter. The symptoms were great pain in the site of the stomach, frequent and violent vomitings, and great weakness and wasting. The boy was at school when first taken ill, and had for some time concealed his complaint; but as he became soon much worse, with constant vomiting of *ingesta* and emaciation, he was brought home to be more carefully attended. The disorder was already of some months standing; and though a variety of medicines had been tried under three of the most eminent physicians of the time, no benefit resulted; and each had after sufficient trial given up the case, having nothing farther to propose. Opium in the fluid state at first remained in the stomach, and procured temporary relief; but it failed at length, and like food, drink, and every medicine taken, was immediately rejected by vomiting. The last remedy tried was a pill of solid opium, which for a time eluded the expulsive power of the stomach; but after a little use that also was rejected.

The only cause assigned for this obstinate disorder was, that the usher of the school had grasped him by the waistcoat at the pit of the stomach, and shaken him rudely; and it was stated, that, though this was not at the time painful, the disorder ensued soon after.

After attentive examination of the region in various situations and postures, no fulness, hardness, or tension could be discovered. The abdomen was flat and drawn inwards. The person of the boy seemed like a skeleton covered with skin; and the countenance was expressive of the greatest possible weakness, suffering, and misery.

The treatment recommended was, *1st*, to rub the epigastric region for half an hour at a time, every morning and evening, by the hand with warm oil; and *2d*, to give him only one table-spoonful or even a smaller quantity of milk, which might be retained, at such intervals that vomiting should not be induced. If this were followed by the expected effect, then a transition was very gradually to be made to larger quantities, and eventually to thin gruel, and similar articles.

Though Dr Hunter had little hope of the case, between two and three months afterwards, the father of the boy informed him that the method was observed with scrupulous exactness; that the boy had never vomited since; that he was daily gaining flesh and strength, and very importunate for more substantial food. Complete recovery was effected.

The symptoms which attended this case, their duration, and the effects of the treatment, show, I think, very clearly that they must have been produced by chronic inflammation of the villous membrane of the stomach.*

Several cases somewhat similar, and treated much in the same manner as to dietetic rules, are detailed in an appendix to this paper by Mr Hey of Leeds; but in none do the symptoms of inflammation appear to have been so well-marked as in the case by Dr William Hunter. Excepting in one case, the symptoms appear to have been rather those of irritation than of inflammation.

Similar cases, however, have occurred to other observers. Ranoë, in his account of the diseases of Copenhagen during the year 1789, mentions the case of a man of 40, in whom acute fever, fixed burning pain in the stomach, aggravated by any article taken, which immediately produced vomiting and very painful hiccup, with great and perpetual anxiety, made him infer the existence of inflammation of the stomach. The treatment employed consequently was venesection, the camphorated emulsion, a hot plaster, consisting of stimulants, applied to the epigastric region, and the most antiphlogistic regimen; and under these the symptoms completely disappeared.†

A similar case is given in the 13th volume of the Edinburgh Medical and Surgical Journal, p. 258, by an anonymous correspondent.

I have seen a number of instances of pain referred to the interior of the stomach, of different degrees of severity, often with tenderness in the epigastric surface, with or without vomiting, generally with *anorexia*, furred tongue, thirst, and heat of skin, all of which disappeared much more readily under the employment of blood-letting, general and local, than any other means. For such cases, indeed, within the last ten or twelve years, I have seldom employed any other remedy, as I had previously found that these cases, if treated by cordials, opiates, and tonics or stimulants, were invariably aggravated. In one of the most characteristic of these cases, which took place in a young female of 18, both the sense of pain within the stomach and the external tenderness were so great, that the slightest pressure could not be borne. Food of almost every kind was

* Medical Observations and Inquiries, Vol. vi. p. 310. London, 1784.

† Acta Regiæ Societatis, Med. Hafniensis, Vol. iii. p. 247. Havniæ, 1792.

rejected; the tongue was covered with a thin semitransparent viscid coating, which gave it a glossy aspect; the countenance was pale, and the features contracted and expressive of great suffering; the skin was dry and harsh, with coldness of the extremities; the pulse varied from 86 to 92, and was small and sharp; and the flesh was much wasted and the strength impaired. The remedies employed were blood-letting from the arm, local bleeding by means of leeches from the epigastric region several times repeated, laxative *enemata*, and, when the epigastric pain was gone, mild laxatives, and the warm bath. Under the use of these measures all the symptoms disappeared in the course of five weeks; and under a mild diet the patient recovered flesh, strength, and complexion.

It appears to me to be impossible to explain the phenomena of cases of this description without ascribing them to some degree of inflammation of the villous membrane of the stomach. The symptoms evidently vary in different cases, probably from the part of the stomach affected, as well as the degree of the disorder. In all, there is more or less disorder of the process of digestion, such as *anorexia*, flatulence, heartburn, pain sometimes constant, sometimes periodical, and appearing chiefly when food or drink of irritating effects, either by quantity or quality, are taken,—and tenderness of the epigastric region. The pain may be acute at intervals; but there is often a constant sense of dull uneasy aching. A symptom which I regard as extremely characteristic of this disorder, is a dry clammy sensation of the mouth and throat, often felt most intensely during the night and in the morning, with the glossy, smooth, viscid appearance of the tongue.

If it be asked how this disease is to be distinguished from *Dyspepsia*, the answer must be, that, from certain forms of dyspeptic disease, it is not to be distinguished. One form of *dyspepsia*, that dependent on irritation of the mucous membrane of the stomach, is very similar to, if not the same with, the irritative stage of the disorder now described; and the latter is simply an intense and inflammatory form of the irritative state.

This disease appears to have various modes of termination, according to its degree and state. The irritative form may terminate in resolution or in the inflammatory form of the disease, giving rise to all the symptoms of obstinate dyspeptic disorder, with wasting of the flesh and strength. The inflammatory form

may terminate in resolution or in the irritative stage, or may induce fatal destruction of the tissues of the stomach.

In ordinary circumstances irritative *gasteria* is seldom by itself a fatal disease; and it has a tendency, after running a certain course, to subside spontaneously, so far as the mucous membrane of the stomach is concerned; but it may terminate in other disorders, as diarrhœa, dysentery, disease of the spleen or liver or pancreas, or disease of the brain or lungs.

In some subjects it appears to induce chronic inflammation of the substance of the villous coat, or inflammation and enlargement of the mucous follicles. In others it may, under the influence of acute disease, terminate in softening.

In some instances it is known to precede the appearance of scirrhus affections of the organ;* and it is not unreasonable, therefore, to infer, that irritative and inflammatory *gasteria* may terminate in scirrhus enlargement of the muciparous follicles.

In all the descriptions already given, I speak of an irritative state confined very much to the secreting surface of the gastric villous membrane, passing by insensible transitions to inflammation of that surface. When the inflammatory action is more fixed, intense, and more constantly maintained by the endurance of the irritating causes, it is liable to affect the substance of the membrane; and, in such circumstances, portions of the villous membrane have been said to be exfoliated or separated, and parts have been said to be removed by the ulcerative process. The separation of the villous membrane here mentioned might be a pseudo-membranous production, several examples of which, I have already mentioned, have fallen under the observation of various authors. When part of the villous membrane is removed by ulceration, that process seems to take place, not as an effect of the diffuse irritative inflammation of the mucous surface, but as a consequence of some action of a different nature, and under circumstances also widely different; and I am therefore disposed to refer this form of disease to a different head, immediately afterwards to be noticed.

Dr Baillie has drawn a distinction between diffuse inflammation of the stomach, proceeding, I presume, from the introduction of acrid or poisonous irritants, and inflammation of a

* Pinel Nosographie Philosophique, Tome ii. paragraph 315, and p. 301, et Medecine Clinique, p. 198.

limited portion of the gastric villous membrane; and in the latter case he represents the inflammation to be seldom violent. This author has left it completely undetermined, whether, by this language, he means that the anatomical appearances of the inflammatory process are not well marked, or that the symptoms produced are not intense. From the collateral and subsequent remarks, it appears that he referred chiefly to the former; as he states that "the outside (the peritoneal coat) of the stomach, at the inflamed part, shows a greater number of small vessels than usual, but is commonly not much corroded; that the stomach is thicker at the inflamed part; that the mucous membrane is very red from the number of small blood vessels; and that there are frequently spots of extravasated blood." The language here used, shows, that, by the inflammation not being violent, Dr Baillie must have meant that the traces of it in the peritoneal coat were not very well marked; for it is evident that in the villous coat they were as distinct as could be desired. It is unfortunate that this pathologist has not left more distinct views of the circumstances under which this inflammation takes place.

Irritation and inflammation of the villous membrane of the stomach may arise spontaneously, or in consequence of the operation of internal causes not well understood. The most common cause is the introduction of acrid irritating substances, as sulphuric or nitric acid, corrosive sublimate, nitrate of mercury, hydrochlorate of tin, caustic potass, ammonia, and boiling water or hot fluids.

It is represented by Cullen to occur in persons recovering from fever, and in diseases called *putrid*; but I know not on what authority. I have already said that in ague, in remittent, and in continued fever, and in plague, inflammation of the gastric villous membrane does occasionally take place; but in the bodies of several cases, in which the appearances conceived to indicate the presence of inflammation were recognized, it is evident that they were phlegmasioid only.

I have seen and elsewhere described instances of softening of the villous membrane of the stomach, occurring in the course of typhous fever; and from the testimony of Louis, this seems to take place in nearly one-third of the cases in Paris. In this country it is less frequent. In the cases to which I allude, the membrane was in certain parts reddened; but where-

ever it was softened, it was of an ash gray, or slaty dirty colour, quite soft, and came away in shreds.

The symptoms were not in cases of this class very well marked; but this I attribute to the general impaired sensibility by the action of the fever. As innervation is enfeebled, and almost extinguished, the symptoms produced by morbid action are also indistinct. It was in several cases, however, attended with more or less pain and tenderness in the epigastric region, and sometimes with hiccup. In a few cases it was associated with softening of the spleen.

Louis found that simple softening of the gastric villous membrane took place in rather fewer than one-third of the cases of typhoid fever, and softening with attenuation in about one-fifth part of the cases. As, however, these forms of softening take place in the course of other diseases, in the respective proportion of one-fourth and one-sixth part, M. Louis infers that this lesion is not peculiar to fever, and that the only legitimate conclusion is, that in all cases in which an acute disorder, whatever it be, gives rise to febrile symptoms of any duration, the mucous membrane of the stomach becomes, at a variable period of the disorder, the seat of a lesion more or less severe, which is often the cause of death, and always accelerates that event. In regard to the nature of this lesion, he doubts whether, in all cases, softening with attenuation is of an inflammatory character.*

c. The villous membrane of the stomach is liable to another species of lesion, with breach of substance, differing not only in the course which it follows, but in the symptoms to which it gives rise. This consists in chronic inflammation confined to one or two small spots, which shows no tendency to spread along the surface, but at once fixes on the substance of the villous coat, penetrates through it to the submucous cellular tissue, and, destroying the former by ulceration, exposes the latter, and eventually descends to the muscular and peritoneal tunics.

As all the cases of this lesion almost, from which our knowledge is derived, have been described as instances of rupture or perforation of the stomach, it is not ascertained what is the

* *Recherches Anatomiques Pathologiques et Therapeutiques sur la Maladie connue sous le nom de Gastro-Enterite*, Tome i. p. 1-181. Paris, 1829.

exact state of the villous membrane in the incipient stage of the disorder. There is no doubt, however, that, to view the disease as either perforation or rupture merely, gives a most erroneous idea of its nature and progress; and it is equally certain, that, as the perforation is in all cases the result of previous ulceration of the mucous membrane and the subjacent tissues, it seems most reasonable to infer that this ulceration is the result of previous inflammation of the villous membrane.

Instances of this lesion have been recorded by Morgagni,* Dr Carmichael Smyth,† Gerard,‡ Dr Baillie,§ Dr Crampton,|| Mr Travers,¶ Laennec,** Dr Abercrombie,†† Dr Elliotson,‡‡ M. Duparcque,§§ M. Uebersaal,||| and M. Goepfert.¶¶

From these cases, and three which have been observed and inspected by myself,*** I conceive the following general conclusions regarding the nature and character of this lesion may be deduced.

1. It is, in the first place, remarkable that the majority of these cases of ulcerative destruction of the mucous membrane of the stomach are situate either in the small arch of the stomach, or very near the small arch. In the case by Dr Carmichael Smyth, it was in the anterior part towards the *cardia*. In the first case by Gerard, it was in the small arch, one inch from the pylorus. In his fifteenth case also, a circular hole was found at the right and anterior side of the small curvature. It is unnecessary to refer to all his cases, because he does not distinguish between simple inflammatory ulceration and that which is the effect of tubercular destruction and cancer. In the case by Dr Baillie, it was near the small curvature on its posterior side, about two inches from the *cardia*. In the case by Dr Crampton, it was at the

* De Sed. et Caus. Epist. xxix. 14. I am doubtful whether this case be not the result of tubercular ulceration.

† Medical Communications, Vol. ii. p. 467.

‡ Des Perforations Spontanées de l'Estomac. Par M. Alexandre Gerard, D. M. &c. Paris, 1805.

§ Morbid Anatomy, Chapt. vii. Lond. 1825; and Miscellaneous papers and Dissections, p. 199.

|| Medico-Chirurgical Transactions, Vol. viii. p. 228.

¶ Ibid. Vol. viii. p. 271.

** Revue Medicale, Mars 1824.

†† Edin. Med. and Surgical Journal, Vol. xxi. p. 3.

‡‡ Medico-Chirurg. Trans. Vol. xiii. p. 26.

§§ Archives Generales, Vol. xxvi. p. 123.

||| Ibid. Vol. xxvi.

¶¶ Rust's Magazin, 1830. F. 32. 3. C.

*** Edin. Med. and Surg. Journal, Vol. xlv. p. 262.

union of the cardiac and pyloric portions. In the instance of the late M. Beclard, the anatomist, who had laboured under symptoms leading to the suspicion of chronic inflammation in the gastric mucous membrane, and in whom these symptoms had subsided under the employment of local bleedings, frictions with antimonial ointment, and restrained diet, after death from disorder of the brain, a cicatrized ulcer was found in the small arch of the stomach the size of a sixpence, about four lines from the *cardia*.*

In the cases by Ubersaal, Goeppert, and in the three seen by myself, the ulceration was situate in the small curvature. In the two latter, indeed, of the cases described by me, the ulceration of the villous membrane was bisected by the line of the small arch.

2. Whatever part of the organ they occupy, the different tissues are always destroyed in unequal degrees;—the villous membrane being most extensively destroyed, the filamentous and muscular less so, and the peritoneal least. Indeed, it is by no means certain that the peritoneal is destroyed by ulceration, as it seems rather to give way after the other tissues have been removed from it and cease to support it, than to undergo loss of substance itself.

3. Though the ulcers now mentioned resemble ulcers in other parts of the body, they have nevertheless a very peculiar character. The mucous membrane is always exactly destroyed to certain well-marked limits; and the edges which are formed by the mucous membrane are in all cases well defined: They appear as if some time previously a part had been cut or punched out from the villous membrane with a sharp instrument, and the edges had healed so as to present a uniform smooth boundary round the excavation which had been made.

4. It is always possible to distinguish at one part of the ulcer, viz. round its edges, whether perforation has taken place or not, the submucous filamentous tissue and the muscular coat, being much less extensively destroyed than the villous membrane. From this it may be inferred, that the process had first attacked the villous membrane, and after destroying that, had proceeded to the filamentous and muscular. In some instances, only a portion of the villous coat is destroyed, and the bottom of the ulcer is then formed by the filamentous and muscular layers yet comparatively uninjured. In other instances,

* Billard de la Membrane Muqueuse. Paris, 1825, p. 558.

however, all the tissues are destroyed down to the peritoneum, in which perforation takes place.

5. The villous membrane forming the edges of the ulcer is often quite free from redness, vascularity, or thickening, and is always completely without either tubercular deposition, irregularity, or hardness, such as might be expected in scirrhus. The surrounding structure of the stomach is quite healthy and unchanged. Sometimes, however, the margins are a little thick, firm, and sharp, and more or less opaque;—changes which depend on effusion of lymph. It must be admitted, however, that the destruction of the villous membrane of the stomach must have been the effect of inflammation, originating most probably in the villous membrane, and giving rise to the ulcerative destruction when the membrane was no longer able to resist the intensity of the action. This is evidently inflammation of the substance of the membrane, circumscribed in character and chronic in duration. Is there any reason to suppose that it was the result of inflammation of the submucous filamentous tissue?

6. In all these cases it is a common character, that there is at the close of the disease, inflammation of the peritoneal membrane, with effusion of lymph, in proportion as the ulcerative process affects the *peritoneum*.

7. Perforation or rupture, though the natural termination of these cases, is nevertheless not necessary to the disease. Death may take place by mere *peritonitis*, without effusion of the contents of the stomach into the abdominal cavity. In this case, the adjoining organs are generally applied accurately over the part of the stomach where the ulcer is situate, and by the adhesion effected by the inflammatory exudation, perforation and escape of the contents are prevented. No escape took place in any of the three cases inspected by me. Under such circumstances, therefore, peritoneal inflammation is rarely general or extensive. When perforation takes place, of course the inflammation is very general and intense. This result, however, depends much on the position of the ulcer or ulcers. When they are situate on the anterior part of the stomach, at some distance from the small arch, at which no contiguous organs are applied over the stomach, perforation and escape of the contents of the stomach are very liable to ensue.

8. The symptoms produced by this disease are not well

marked. In all the cases almost which have been recorded, though the patients have not been in perfect health, yet they have been free from any symptom calculated to excite apprehension, and they have been in general suddenly and unexpectedly surprised by death.

In the cases which came under my own observation, the individuals had for a considerable time laboured under obscure and imperfectly marked dyspeptic symptoms, with loss of flesh, and increasing languor and weakness. In two of them profuse hemorrhage had taken place from the stomach at different times,—circumstances which were afterwards explained by the position of the ulcer on the line of the coronary artery. A similar source of hæmatemesis was recognized in the case given by M. Goeppert, as occurring in the person of a young man who had suffered from *anorexia* and tension at the pit of the stomach, but without being aggravated by pressure.

Pain is by no means a constant symptom. In the case given by Dr C. Smyth, the patient had occasional but not severe pain at the stomach. In that by Dr Baillie, the patient had violent occasional pain in the *scrobiculus cordis*, with vomiting, most liable to ensue after meals. In most of the other cases, the sense of pain was either trifling or not uniform. But in all there appears to have been a sense of dull gnawing or aching, either constant or pretty frequent. In one of the cases seen by myself, though the patient always complained of pain, it was referred to a point deep in the epigastric region, towards the spine,—a peculiarity which I think was due to irritation of the extremities of the nervous filaments sent along the small arch.

The pulse also is not much affected in this disease.

The circumstances now remarked, however, apply only to the early stage of the complaint, while it is still confined to the villous membrane, or at most does not touch the peritoneum. When the ulcerative action penetrates through the gastric tissues and begins to affect this membrane, it produces also slight and limited *peritonitis*, which, if there be other organs applied on the part, tends to protract the life of the patient, and retard for a little the approach of the fatal event. With this peritoneal inflammation, the pulse becomes quick and sharp, and the patient complains of more or less pain in the epigastric and umbilical regions. But when the ulcerative destruction has reach-

ed the peritoneum, the life of the patient hangs by a thread. The most casual occurrence, as a fit of sneezing, coughing, eructation, or vomiting, or, even without these, the distension of the stomach by drink or by air extricated from flatulent food, may produce perforation, and cause the escape of gaseous and fluid contents into the cavity of the abdomen, and general peritoneal inflammation very speedily fatal.

It is, therefore, too often only at the close of this disease that the practitioner can even conjecture its true nature.

In every case, however, in which obstinate dyspeptic complaints are accompanied with a gnawing sensation, more or less constant, referred to the region of the stomach, or occasional acute pain, with loss of flesh, weakness and languor, and with the frequent rejection of *ingesta*, the presence of chronic inflammation and ulceration may be suspected. This conjecture will be converted into certainty, when, after a course of such symptoms, the patient is suddenly and unexpectedly attacked with feelings of faintness and sinking, acute pain generally radiating from the epigastrium or navel, all over the belly, pale, shrunk features, small rapid pulse, followed by rapid breathing and cold extremities; and dissolution may then be certainly apprehended.

DIAGNOSIS.—This species of gastric inflammation and ulceration has been confounded by several authors with cancerous destruction. From this, however, it is to be distinguished by the absence of any considerable thickening or induration in the vicinity of the ulcer, or in any other part of the stomach, by its presenting less intense gastric symptoms, and by its taking place either principally in young persons, or in persons of all ages; while cancer is rather the disease of declining years.

TREATMENT.—The treatment of gastric inflammation, whether irritative, diffuse, and superficial, or limited and penetrating, is to be conducted upon the general principles of moderating and removing inflammatory action and allaying irritation, and on the application of the particular measures calculated to remove those of the gastric villous membrane.

In cases in which pain either of the epigastric region, or referred to the interior of the stomach, and occasional or frequent vomiting, form prominent symptoms, blood-letting, general and local, is the remedy calculated to afford most relief. At the same time many of the individuals who are the victims of this disease seem not well calculated to bear general blood-letting, nor is

the pulse so tense or rapid as to indicate the necessity of that evacuation. In cases, however, in which the disease is of recent origin, and the strength of the patient not much impaired, one general blood-letting of from twelve to eighteen or twenty ounces should be taken; and the effects of this will guide the practitioner as to his subsequent course.

To the generality of cases local bleeding by means of leeches is much better adapted; and this method of depletion should be practised repeatedly until the symptoms of epigastric tenderness begin to decline.

In all cases of gastric inflammation, whether subacute or chronic, whether diffuse and superficial, or limited and penetrating, the employment of revellents is indicated, and is always beneficial. For this purpose the common blister, or friction by the antimonial pomatum, or by means of croton oil, or, if these seem too severe applications, friction steady and long-continued with camphorated oil, saponaceous camphorated spirit, or the ammoniated liniment may be employed.

In all cases of superficial inflammation of the gastric villous membrane, the principal reliance is to be placed in dietetic measures. As it is clear that in every instance inflammation is not only aggravated by irritation, but may be the consequence of the irritative state, so the great and most powerful means of abating and removing this condition is the positive abstraction of all sources of irritation. Of the efficacy of this principle it is impossible to imagine a better illustration than that given by the treatment of the boy mentioned by Dr William Hunter. Where the food is rejected, or where its introduction causes or aggravates pain, it should be at once reduced to the smallest possible quantity, and made of the simplest and least irritating materials. Small quantities of milk and water, or gruel, or any of the vegetable jellies, as arrow-root, sago, salep, or tapioca, are all that should be taken while the symptoms are urgent. In less intense cases the most digestible farinaceous articles, as boiled barley, boiled rice, boiled biscuit powder or flummery (sowens) with milk, may be employed for subsistence. The great object to be kept in view is to afford no more alimentary matter than the stomach can easily digest, and, above all, to avoid all articles liable to generate air and distend the stomach. If the process of digestion cause any excitement to the stomach, it

cannot fail to aggravate the disorder of its villous membrane, whether irritative, inflammatory, or ulcerative.

Upon this principle, when thirst is urgent, and the patient is anxious for drink, he should take only small quantities at a time, and the liquors used should be of the mildest quality. Toast-water or barley-water answers well.

All fermented liquors, and all vinous and spirituous stimulants, however diluted, should be absolutely and completely interdicted.

Opiates are sometimes useful after the urgent symptoms have been subdued by means of depletion, in allaying morbid irritability. They are however by no means free from danger. They may mask and disguise those sensations which are the best guides the practitioner can have in conducting the treatment of the disorder. They should be given with a sparing and delicate hand.

In the last stage only, when we have no hope of curing the disorder, and when all that is left the practitioner to do, is to alleviate the agonizing sensations, the cause of which he cannot remove, opiates may be given more freely, and must be repeated according to their effects, and the feelings of the patient.

In disorders of the class now under consideration, many looking only to the dyspeptic symptoms, and prescribing consequently according to the degree and nature of these symptoms, administer bitters, tonics, antispasmodics, and antacids. The whole of these remedies are either useless or extremely pernicious. After the explanation already given of the pathological state of the gastric villous membrane, it must be superfluous to enter into any detailed argument to show the inadequacy and unfitness of these agents for the treatment of the disorder. The whole tribe of bitters and tonics, and especially bark or sulphate of quinine, can only irritate and over-excite the already irritated membrane, and instead of abating, cannot fail to aggravate the disease. Antacids are probably merely useless; but if they be required for symptoms of flatulence or heartburn, they should be given as sparingly as possible. The most useful, perhaps, is the subcarbonate of soda. But the best antacid will be found in the due regulation and selection of the diet.

d. A peculiar species of softening of the villous membrane of

the stomach in infants and children, with or without perforation, has been observed by Jaeger, Cruveilhier, and others, and has been made the subject of an able essay by Dr John Gairdner, who infers, from the phenomena of a numerous collection of cases, that there exists in the stomachs of the infants destroyed in this manner, a peculiar state or action analogous to inflammation, which renders the stomach more readily soluble by the gastric juice after death, than in the case of children not affected by this disorder. It is, in short, according to Dr Gairdner, the result of the operation of two causes; one a peculiar disorder of the gastric, and perhaps the intestinal mucous membrane; the other that of the gastric juice, which then dissolves, with peculiar facility, the textures of an organ already enfeebled by disease. (Ed. Med.-Chirurg. Trans. Vol. i. p. 311. Edin. 1824.)

This view, however, has been recently opposed by Dr Carswell, who maintains, from the evidence of various facts, and an elaborate course of experiments on the lower animals, that this softening and perforation is altogether the result of solution or digestion of the stomach after death. (Edin. Med. and Surg. Journ. Vol. xxxiv. p. 282. Edin. 1830.)

It seems a matter of extreme difficulty in the present state of the inquiry to arrive at a positive conclusion. But it appears to me, that the therapeutic precepts recommended by Dr Gairdner are entitled to the serious attention of the physician. It is clear, that, in certain cases of infantile disease taking place during lactation, or about the period of weaning, and the transition to a different sort of food, the alimentary functions are liable to become seriously disordered, and the tissues of the stomach and bowels to become the seat of a new, and in some respects an anomalous irritation. To allay and remove this, therefore all the most probable means should be adopted. Dr Gairdner recommends local bleeding, blistering, opiate *enemata*, and the warm bath. Diluents and antacids may also be useful.

§ XIV. *Enteria; Splanchnia; Ilei Inflammatio; Ileonia. Enteritis Erythematoides. Diarrhœa crapulosa; Diarrhœa mucosa. Catarrhus Intestinalis; Diarrhœa Catarrhosa.* Hildenbrand, Vol. ii. p. 106. *Diarrhœa Catarrhale.* Pinel, Vol. ii. p. 116.

The impropriety of referring inflammation of the mucous coat of the intestinal tube to the same nosological place with

inflammation of the serous surface, is particularly obvious in the nosological character which Dr Cullen has delivered of this disease and *Enteritis*. After inserting *vomiting* and *obstinate constipation* in the generic character of enteric inflammation, he asserts a contradiction by denying these symptoms, and stating *diarrhœa* as a character of the second species. It is singular that the symptoms which this eminent nosologist has enumerated in his two species of enteric inflammation, did not lead him to correct two errors in his nosological arrangement. The characters which he has justly ascribed to *enteritis* as a genus, are the same with those which distinguish the first species, or proper inflammation of the intestinal coats. Those, however, which are ascribed to erythematic, or what I term inflammation of the mucous intestinal surface, are quite opposite, and indicate a disease very different, if not in its nature, at least in situation and effects. This latter disease is neither attended with vomiting nor constipation, and it is uniformly distinguished by considerable discharge of fluid stools, which may or may not be accompanied with griping and tenesmus. The local pain is in general slight, and sometimes cannot be recognized. But in many instances I have observed that, if pressure be applied for a considerable time, and directed in such manner as to affect the bowels deeply, a dull sense of soreness is felt by the patient. The affection of the circulating system is always inconsiderable, at least in the beginning of the disease, and many instances of *enteria* pass through all their stages with a pulse never above 80, sometimes under 70. It is different with the state of the tongue, which is always much coated, generally with a white or gray viscid fur, attended at the same time with considerable thirst.

These are the symptoms which mark the presence of *Enteria*, or inflammation of the intestinal villous membrane; and it will be perceived that they differ so materially from those with which *Enteritis* or enteric inflammation is attended, that the disease which they indicate, ought not to have been associated with this last one.

The careful observer further remarks, that the symptoms of *Enteria* approach more closely to the disease described under the name of *Diarrhœa*; and a perusal of the history of *diarrhœa* and its alleged causes shows that it is in most cases dependent on an irritated or inflamed state of the intestinal mu-

cous membrane. It appears, indeed, probable, if not certain, that the disorder which Dr Cullen and others described as *diarrhœa* is only a symptom of enteric irritation or inflammation; and that it ought not to have obtained a place as a separate disease in a system professing to be founded on philosophical principles. When, therefore, Dr Cullen converts *diarrhœa* from a mere symptom into a disease, and, with a mistaken view of its pathological cause, places that disease among the irregular motions (*spasmi, motus abnormis,*) he appears to me to have committed a second error both in pathology and in arrangement. The increased action (*motus abnormis*) in which he believed the disease to consist, is a part only, or one of several pathological events, which are intimately connected; but that it is not the earliest or first of these, is evident from the subsequent examination into which he enters of the various causes by which it may be induced. I think it clear, on the contrary, that the various stimuli (1474, 1475, &c.) to which he ascribes this increased motion, operate in the first instance by producing irritation of the mucous membrane, which is attended, as in other circumstances, with an augmented afflux of fluids to the vessels, and then a discharge not only of mucus but of other fluids from the membrane or its blood-vessels. It is this augmented discharge or secretion which, by secondary effect, rouses the muscular fibres to an unusual degree of peristaltic motion, and thus gives rise to the numerous fluid stools with which the disease is attended. The increased action, therefore, is the effect of a preliminary process, and, instead of being the cause, is only a part of the disease. I do not, however, deny that there may be some cases of unnaturally frequent intestinal discharge, which depend on irregular or excessive action of the intestinal fibres; but I think it very difficult to distinguish them. On the whole, I think that it is possible to adduce conclusive evidence to show that the frequent fluid alvine discharges to which physicians have given the name of *diarrhœa*, are, in the greater number of cases, to be referred to a state first of irritation and then of inflammation of the mucous surface of the intestines, spreading in general over a considerable extent, and rarely penetrating to the submucous filamentous tissue, or to the muscular fibres.

During the autumnal and winter months in this city, it is common to meet with instances of disordered bowels, in which

the frequent fluid stools evidently depend on superficial irritation and spreading inflammation of the mucous membrane. The complaint commences in general with very slight, in some cases, imperceptible sickness; and copious feculent discharges, much thinner than natural, speedily follow. The surface is at the same time easily affected by cold; the individual is inclined to shiver, and yet complains of thirst and occasional internal heat. The mouth and throat are dry, the tongue is furred, sometimes moist, sometimes dry; but if moist, it is always viscid and clammy. The appetite is lost. The pulse is at first not affected, or is small and weak; but if the disease continues beyond twenty-four or thirty-six hours, it is found to be full, and about eight or ten beats quicker than natural; afterwards it may rise to 90 or 100, when it is generally small and hard. The skin is dry and imperspirable, and the hands and feet are commonly the seat of an unpleasant sensation of heat and burning.

With these general symptoms are combined local signs, which it is useful to observe. The patient complains of occasional griping, with a distressing sensation of distension from wind, and incapacity to expel it; the bowels are constantly moving with noise, (*borborygmi*) but without much effect; and after a few hours of the disease, *tenesmus* comes on and increases. At the commencement of the complaint the stools are feculent and consistent; after the second or third discharge, they are then watery, and sometimes mixed with blood. In general they are mixed with indigested articles of food. The belly is not painful when pressed; but the patient complains of a constant uneasy sensation deep in the belly; and if pressure be applied to the parts to which he refers this sensation, it is accompanied with pain. The pressure, however, must be directed slowly and gradually, so as to cause the opposite sides of the bowel pressed to meet; as it is only under circumstances of this kind that the sense of pain is produced. This sensation of pain is slight at the commencement, but soon becomes more severe and constant. The belly is at the same time distended with wind, which may in general be felt moving under the hand.

This disease may terminate spontaneously, the stools becoming gradually less frequent and copious, until they become natural. In general, however, remedies, chiefly opiates, and

those which have a sudorific effect, are employed, and the patient becomes well. It is, therefore, next to impossible to obtain the evidence of dissection in this stage of the disease; but when it is neglected, or allowed to go on, or to be aggravated by irregular or improper diet, exposure to cold, and improper treatment, especially by astringents, it assumes a chronic form, or may pass into general inflammation of the intestinal villous membrane. In the first case, the diarrhœa continues, and may be aggravated to dysentery, when the intestinal mucous membrane is found after death much redder than usual, swelled, pulpy, or villous or thickened, with occasional bloodshot patches, and abrasions of the mucous coat of the colon. In other instances, the intestine may be dark-red, purple, or livid, from extravasation of dark blood, but without mortification. The *peritoneum* is in such circumstances rarely affected, unless constipation, acute pain, and the ordinary symptoms of enteric inflammation have preceded death for some days.

That the presence of diarrhœa may depend on an irritative state of the intestinal mucous membrane, which is liable to pass into superficial inflammation, is a principle of which the writings of physicians as well as daily experience afford abundant evidence. Several of the most important facts and arguments tending to establish this conclusion, I have adduced in my *Elements of Pathological Anatomy*; and as the limits of the present work do not allow me to repeat them here, while I make a general reference to that work, I add, that similar evidence may be found in the writings of Hildenbrand, Broussais, Pinel, Prost, Petit and Serres, Dr Latham as to the Penitentiary at Milbank, Bretonneau and Louis.

All the facts hitherto observed on this subject, and above all, the nature and effects of the exciting causes, show, that the disorder is, in the first place, an irritation, more or less intense, of the mucous membrane and its follicles, both isolated and agminated. The agminated follicles seem principally to be the seat of irritation in the *ileum*; and in the colon the isolated glands are principally affected. These follicles, especially the former, are found large, prominent, and distinct in persons liable to catarrhal diarrhœa, or, as they are usually designated, persons of irritable bowels.

The alvine discharges in this state of the bowels present not only much mucus, but a considerable quantity of serum, and

some jelly-like matter, which cannot be supposed to proceed from any other source, except that of the muciparous follicles in a state of excessive and preternatural irritation. This constitutes the form of disease denominated by Bretonneau *Dochthenteritis*. A more appropriate name would be *Adenenteritis*.

It may be further inferred, however, that several repeated and successive attacks of mere irritation of the follicles are requisite to excite inflammation in these bodies. The reason for this opinion is, that recoveries from catarrhal diarrhœa are frequent in the same individual; and it is only after the disease has been protracted by repeated exposure to the exciting causes, or by injudicious treatment, or has been reproduced, that inflammation becomes chronic and obstinate, and terminates in ulceration. The stools are then more or less of an ochrey colour.

The duration of this disease varies from one or two to six, eight, or ten weeks, when it may be said to be chronic. It may terminate spontaneously in resolution, but it more generally requires the aid of art. It may be fatal in one or two weeks, or it may be protracted to the eighth or ninth. Its fatal termination in the active state are, 1st, by rapid wasting of the strength and flesh by the natural course of the disease, and its effects on the alimentary function and general nutrition;—a species of death by atrophy; 2d, by extending to the submucous intestinal tissue or to the peritoneum, when *enteritis* or *peritonitis* takes place, and kills, if not prevented, in the usual mode. In the latter case, the frequency of the stools generally diminishes for two or three days previous to death; and constipation, more or less obstinate, takes place, as in other instances of enteritic or peritoneal inflammation.

Enteria may occur as a primary or idiopathic disease in infants at any season, and in adults, but especially in autumn and winter, or whenever the air is cold and humid. It follows exposure to cold, especially wet feet, in certain subjects; sleeping in damp apartments or damp beds; certain articles of food, especially salmon, fresh pork, or fat substances taken in any form for food; the vegetable acids, or substances containing them, as grapes, especially if grown in this country; Scottish apples, the berry of the mountain-ash (*Pyrus aucuparia*,) acid wines, especially the domestic currant wine, cyder, bad or imperfectly fermented malt liquor, and all similar substances. A familiar cause to the professional student is long exposure

to the air of the dissecting-room, where it is generally ascribed to the exhalations of putrid animal matter, which perhaps are rendered more efficient when combined with the cold air, which is often thought requisite in such situations. Another set of agents, with which we are more or less acquainted, as the causes of *enteria*, is found in the drastic purgatives, as bitter apple (*Cucumis colocynthis*,) scammony, gamboge, black hellebore (*Helleborus niger*,) meadow-saffron (*Colchicum autumnale*,) buckthorn berries (*Rhamnus catharticus*,) hedge hyssop (*Gratiola officinalis*,) wild or squirting cucumber (*Momordica elaterium*;) various mineral poisons, as white arsenic (*oxydum arsenici album*,) antimony in some instances, sulphate, acetate, and oxide of copper, and calomel under certain circumstances.

In other circumstances, *enteria* occurs secondarily as a part or consequence of other diseases. It may occur in fever, intermittent or continued, especially if accompanied with symptoms of typhus, (Broussais, p. 124, 150;) after small-pox (Petit and Serres; Louis;) scarlet-fever, measles, and even after catarrh and peripneumony. As a part of the latter stage of pulmonary consumption, it is well known under the name of *colliquative diarrhœa*; and it generally appears in persons labouring under ulcerated joints, lumbar abscess, and most of those diseases which are attended with hectic fever.

In early life, *enteria* appears to be a common disease; and infants and children may be attacked with the most violent diarrhœa from causes which produce no inconvenience, or a mere fit of indigestion in the adult. Thus, in infants at the breast, diarrhœa is common, and may often be traced to slight or imperceptible irregularities in the diet of the nurse. Of these, none are more common than eating the mucilaginous or watery vegetables, as cabbages, greens, &c.; the use of vinegar, honey, fat meats, or acid wines. In children, very slight irregularities will, in the same manner, induce more or less enteric inflammation.

The chronic form of *enteria* varies according to the manner in which it commences. It may, as I have above said, succeed to the acute form after some weeks; and every instance of the acute disease, which continues six or seven or eight weeks without amendment, and with the ordinary intestinal discharges, may be regarded as in the chronic state. In other instances, it is from the commencement and through its whole course chronic. According to Broussais, if the discharges are un-

usually frequent, without marked or violent fever and acute pain, and alternating with periods of relief, this may be considered as chronic *enteria* from the first (222;) or the disease may occur in this manner in persons already exhausted by long fever or other tedious disease. Divested of his theoretical language on the operation of morbid causes, it may be said that acute and chronic *enteria* differ in degree and violence of morbid action only. In the former, local pain, vomiting occasionally, numerous loose stools and febrile motion, are the prominent phenomena; in the latter, slight pain, or none at all, occasional diarrhœa, which is liable to be rendered severe and frequent by inattention to food, or the use of purgative medicines, and quickness of pulse, without other febrile motions, are the principal symptoms.

MORBID ANATOMY.—The morbid changes in the intestinal mucous membrane afford the best characters of chronic *enteria*. These may be, 1st, irregularly shaped patches of dark-red, rough, fungous, or granulated portions of intestine, thickened and hardened; 2d, sores or ulcers formed by the destruction of the mucous corion, villi, and follicles, sometimes to the submucous tissue, of no regular shape, and with edges ragged or even, or callous, sometimes proceeding to cicatrization; 3d, hard pustular or tubercular growths of various size, but always accompanied with more or less inflammation, proceeding from enlargement of the follicles of the mucous membrane; and 4th, enlargement of the mesenteric glands, with more or less serous effusion, within the cavity of the *peritoneum*. Bang, who has related several examples of this disease, found the mesenteric glands generally, and very often the mucous follicles, enlarged and hardened. This enlargement of the mesenteric glands, which he considered a cause of the chronic diarrhœa, is merely the effect of the intestinal inflammation.

In infants and children, the state of the intestinal tube deserves especial attention. I have had occasion to inspect the bodies of several children who have died under diarrhœa of short and of long duration; and in general I have found the following appearances. The most usual change is more or less enlargement of the agminated follicles at the lower portion of the *ileum*, which are often elevated, prominent, and firm, sometimes vascular and injected, sometimes softened, pulpy, and ulcerated. The isolated follicles are less frequently enlarged, but they are occasionally more distinct than in the natural state,

and form pustular elevations which Cruveilhier has mistaken for variolous pustules. The villous membrane generally is slightly reddened, often not much, sometimes of a tint between a fawn-red and pale peach-blossom. But its most usual change is a degree of general prominence, roughness, and elevation, with erection of the *villi*, and the firm adhesion of a gelatinous opaque mucus to its whole surface, but especially to the rough patches and the enlarged follicles.

TREATMENT.—The view here given of the pathology of *Enteria* will readily suggest the most proper mode of treatment to be the antiphlogistic, or that which has the effect of abating and checking inflammation. Certain modifications and conditions, however, are requisite, which it is proper that the practitioner should know.

The usual antiphlogistic remedies must be employed with diligence and activity, according to the symptoms; and blood-letting, either from the arm, or by the application of leeches to the belly, will be the most certain method of abating the pain, and diminishing the number of the stools. In cases where either of these remedies is requisite, fifteen or twenty ounces of blood, or eighteen or twenty-four leeches applied to the belly, furnish the smallest scale on which the remedy should be adopted; and they must be repeated until the pain is gone, and the number of stools becomes nearly natural. After this, the best remedies are those which act on the skin, and diminish the afflux of fluids to the bowels. For this purpose, Dover's powder (*pulvis ipecacuanhæ et opii*,) James's powder (*oxidum antimonii cum phosphati calcis*,) or a solution of tartar emetic and laudanum, are the most useful medicines. Their operation may be aided by the warm bath, bathing the feet, &c.; and a flannel roller round the belly, or complete flannel clothing ought not to be neglected.

The effect of purgatives has been said to be doubtful, and their use is condemned by many. When constipation, or an irregular state of the bowels, or slimy mucous stools appear to require them, the best plan is to give a neutral salt, or pure magnesia, or the saline infusion of senna, alternately with opiates. Thirty drops of laudanum, for example, or a grain of opium, may be given at bed time, and four drachms of Epsom salts, or the jalap and calomel bolus, in the morning. When the stomach is flatulent or acid, or where digestion is imperfect, half scruple doses of magnesia will be the best medicine. In

some instances, castor oil agrees well with the intestines, and either conjoined with, or succeeded by, an opiate, has the effect of removing all the worst symptoms. Another mode of obtaining the curative effects of purgatives, is to give them in small doses, for instance, sulphate of magnesia in doses of one or two drachms, and castor oil in the same manner.

These measures are suited to the most severe forms of the disease. In mild cases, blood-letting is unnecessary, and an opiate, with the chalk mixture, or a few doses of magnesia, generally remove the disease.

Injections of mucilaginous fluids, mixed with laudanum, are useful and effectual remedies. The starch injection (*enema amyli nosocom. Edin.*) with sixty or eighty drops of laudanum, or solution of muriate of morphia, may be used when there are severe gripings, tenesmus, and slimy or bloody stools. In more severe cases, where there is reason to think the mucous surface of the colon is inflamed, or abraded, injections of sugar of lead, or of bark, or other astringent substances, may be attempted with caution.

In the chronic form of the disease, occasional leeches to the belly, blisters, and tartar emetic friction, so as to cause pustular inflammation, are the best means of keeping the low chronic inflammation in abeyance. Next to these, local applications by glyster, are the most effectual means of promoting the process of resolution, and healing. For this purpose, lime-water, Goulard extract (*aqua acetatis plumbi*), logwood infusion, and opiate mucilaginous glysters, may be used with advantage. The warm bath, especially of sea water, is likewise recommended.

But amidst all these remedial measures, the greatest attention ought to be given to the management of the diet. This ought to consist of the lightest and least stimulating articles of food, which the patient can take, without regard to his apparent weakness or increasing emaciation. In general, it is prudent to abandon the use of animal food entirely, so long as the stools are numerous, and the abdominal pain acute, or even sensible. Unless this be done, the disease is in danger of assuming the chronic incurable form, termed lientery, after which, medical treatment is rarely availing. If any animal matter whatever be used, it should be in the form of soup, with the farinaceous grains, as barley, rice, groats, &c. The safest kind of diet for a patient labouring under acute enteria is arrow-root, flummery or sowens, sago, tapioca or salop,

gruel of oatmeal, barley-water, toast-water, or burnt oat cake water; the last of which appears to exercise a remarkable influence in allaying the irritation, and removing the morbid sensibility of inflamed bowels.

When the appetite increases, and the abdominal pain and stools are diminished, oatmeal porridge, boiled some time, ground rice, boiled barley or boiled rice may be used with whey, or milk diluted with twice its bulk of water. As the symptoms subside, pure milk, boiled or unboiled, may be substituted; but it is indispensable to watch its effects on the alvine discharges, and in the heat, thirst, and appearance of the tongue. If the state of the functions indicated by these parts be not aggravated, a few days on this species of food may be succeeded by light soup of beef, or chicken, or, what is better, by pudding of ground rice, or bread without butter, or any other ingredient but eggs and sugar. A fresh egg, softly boiled, is also useful; but the greatest caution should be used, that the intestinal inflammation be not brought back, if gone, or aggravated, if on the decline. Under these articles of diet, the patient will recover flesh and strength, if the disease be subdued; and, if it be not subdued, no form or kind of food, let it be naturally ever so nutritious or strengthening, as it is named, will give strength, but will, on the contrary, aggravate the intestinal inflammation, and bring him by sure and rapid steps to the grave.

§. XV. Flux, Bloody Flux. Dysentery. *Colonia; Colitis; Colonitis. Dysentaria alba, Dysentaria rubra; D. sanguinolenta. Morbus Mucosus*, Roederer and Wagler. *Le Sang. Die Ruhr; Die Rothe Ruhr*; German.

Thomae Willis De Febribus, Cap. x. et Pharmaceutice Rationalis sive Diatriba de Medicamentorum Operationibus in Humano Corpore, Sect. iii. Cap. 2. De Dysentaria. Londinensi, anno 1670. Apud Op. Om. Amstelodami, 1682. Thomae Sydenham, Op. Universa, Cap. iii. et Schedules Monitoria de Novae Febris Ingressu. Londini, 1705.—Gruber de Febre acuta Epidemica exanthematico-dysenterica. Basileae, 1747. Apud Haller Disput. Med. Pract. Tom iii. p. 385. Abrahami Vater et Auctoris J. Gottlieb. Vogel de Dysentaria maxime Contagiosa et Maligna superiori anno patriam devastante. Willeberg, 1747. Ibid. p. 399.—Andreae Eliae Buchner et Auctoris Thomae Laurich Disp. de singulari quadam Indorum orientalium Dysentaria ejusdemque praeipua a nostrate differentia. Halae, 1752. Ibid. p. 421.—Jo. Hartm. Degner, Scabini, Historia Medica de Dysentaria quae 1736.—Neomagi et in vicenes pagis epidemice grassata fuit. Trajecti ad Rhenum, 1754.—Dissertation en forme de Lettre sur plusieurs Maladies populaires qui ont régné depuis quelques années a Chalons sur Marne, &c. Par M. Navier, D. M. Paris,

1753.—I. sur la Dysenterie. An Essay on the Autumnal Dysentery. By Andrew Wilson, M. D., &c. London, 1761. 2d edit. Lond. 1777.—De Morbo Mucoso liber singularis quem nuper speciminis Inauguralis loco ediderunt Joannes Geo. Roederer, Med. Anat. &c. P. P. et Carolus Gottlieb. Wagler. Goettingae, 1762.—Histoire d'un Dysenterie Epidemique qui dans quelques lieux de Picardie et Aumale regna pendant l'année, 1750. Par M. Marteau de Grandvilliers, Journal de Medecine, Tom. xviii. p. 42. 1763. Paris.—Marci Akenside De Dysenteria Commentarius. 8vo. London, 1764, et apud Schlegel Thesaurum, Tom. i. Pars. ii. p. 277. Lipsiae, 1789.—An account of the Diseases which were most frequent in the British Military Hospitals in Germany from January 1761 to the return of the troops to England in March 1763. By Donald Monro, M. D., &c. London, 1764, p. 57 of the Dysenteria. Johann. George Zimmermann. Von den Ruhr unter dem Volke im Jahr. 1765. u. s. w. Zürich, 1765.—De Catarrho et de Dysenteria Londinensi Epidemicis utrisque an 1762 Libellus. Auctore Georgio Baker, Collegii Regii Londa. et Coll. Reg. Cantab. Sociis, &c. Lond. 1764.—Observations on the Diseases of the Army. By Sir John Pringle, M. D. London, 1768. Chapter vi.—Essays and Observations, Physical and Literary, Vol. iii. Article xxv. Concerning the state of the Intestines in old Dysenteries. By Dr Donald Monro. Read 1770. Edin. 1771.—A Treatise on Dysentery, with a description of the Epidemic Dysentery that prevailed in Switzerland in the year 1765. Translated from the German of John George Zimmermann, M. D. &c. By C. R. Hopson, M. D. 1st edit. Lond. 1771. 2d 1774.—Maximiliani Stoll Partis Tertiae Rationis Medendi, Sectio iv. De Natura et Indole Dysenteriae Commentatio, Vol. iii. p. 245. Viennae, 1780.—Some Observations on the present Epidemic Dysentery at Plymouth, 1781. By Francis Geach. Plymouth, 1781.—A Treatise on Tropical Diseases and on the Climate of the West Indies, By Benjamin Moseley, M. D. London, 1786.—Observations on Poisons, and on the use of Mercury in the cure of Obstinate Dysenteries. By Thomas Houlston, M. D., &c. Edinburgh, 1787.—Observations on the Diseases of the Army in Jamaica, &c. By John Hunter, M. D. F. R. S., &c. London, 1788. Chap. iv. of Dysentery.—Maximilian Stoll, Partis Quintae act. Medendi, Sect. iii. Febris Rheumatica, Viennae Aust. 1789. Vol. v. p. 405-410. Ibid. Partis 6tae. Aphorismata, Vol. vi. Viennae, 1790.—Observations on the Diseases which prevail in long voyages to Hot countries, particularly on those in the East Indies, &c. By John Clark, M. D. 2d edit. London, 1792. Chap. iii.—Select Evidences of a successful Method of treating Fever and Dysentery in Bengal. By John Peter Wade, M. D. London, 1791.—A View of the Diseases of the Army in Great Britain, America, the West Indies, and on board of King's Ships and Transports, &c. &c. By Thomas Dickson Reide, Surgeon to the 1st Batt. 1st Foot. London, 1793.—Reports on the Diseases of London, particularly during the years 1796-97-98-99, and 1800. By Robert Willan, M. D., &c. London, 1800.—On the Nature and Causes of Dysentery. By Mr J. Christie, 2d Foot, in Medical and Physical Journal, Vol. i. London, 1799.—Observations on Diarrhoea and Dysentery as those Diseases appeared in the British Army during the Campaign in Egypt in 1801, &c. &c. By Henry Dewar, late Surgeon to the 30th. London, 1803.—Account of the Diseases in two Voyages to the East Indies, in the Carnatic East Indiaman. By Mr Milne. London, 1803. Medical Sketches of the Expedition to Egypt from India. By James M'Gregor, A. M. &c. London, 1804, p. 181.—Observations on the Simple Dysentery and its combinations, &c. &c. By William Harty, M. B. London, without date, but published about 1805.—An account of the Diseases of India

as they appeared in the English Fleet, and in the Naval Hospital at Madras in 1782-83, &c. &c. By Charles Curtis, formerly Surgeon of the Medea Frigate-Edinburgh, 1807, p. 8, 117, 161.—Some Observations on Diseases, chiefly as they occur in Sicily. By William Irvine, M. D. F. R. S. Edin. London, 1810, Chapter viii.—Morbid Anatomy. By Matthew Baillie, M. D. London, 1807 and 12.—On the Mercurial Plan of Treatment in Dysentery, &c. &c. By William Fergusson, Esq. Inspector-General of Hospitals to the Army in Portugal. Read 1810.—Medico-Chirurgical Transactions, Vol. ii. p. 180. London, 1811.—Medical Suggestions for the Treatment of Dysentery of Intermittent and Remittent Fevers as prevalent at certain seasons among troops in the Field. By Edmund Sigismund Somers, M. D. London, 1816. Also in Latin.—Practical Observations on Fever, Dysentery, and Liver Complaint, as they occur among the European Troops in India. By George Ballingall, M. D. F. R. S. &c. 1st 1818. 2d edit. Edin. 1823.—A Practical Treatise on Tropical Dysentery, more particularly as it occurs in the East Indies, &c. &c. By R. W. Bampffield, Esq. Surgeon. London, 1819.—Notes on the Medical Topography of the Interior of Ceylon, &c. &c. By Henry Marshall, Surgeon to the Forces. London, 1821. Chapter iv. p. 166.—Manual of the Diseases of Tropical Climates. By Colin Chisholm, M. D., &c. London. 1822.—Medical Report of the Whitworth Hospital House of Industry; containing an account of Dysentery as it appeared in the latter end of 1818. By J. Cheyne, M. D. F. R. S. E. &c. Dublin Hospital Reports, Volume third. Dublin, 1822. p. 1-90.—Sketch of a Medical Report on the Epidemic Dysentery which prevailed in Dublin in 1825. By John O'Brien, M. D. Transactions of the Association of King and Queen's College in Ireland, Vol. v. Dublin, 1828, p. 221.

Observations and dissections of this disease since the time of Cullen have changed and improved the pathological ideas on its nature, and have induced modern practitioners to consider it as a disease somewhat different from what he has represented it to be. It is a disease which varies considerably in different localities, and sometimes according to the exciting cause, on which it depends. The dysentery of this and other temperate regions differs from that which prevails within the tropics; and the sporadic cases, which are seldom totally absent in most European countries, are both less violent and less fatal than the examples of the disease which depend on the operation of epidemic or general causes. Notwithstanding these variations, however, it appears to be now generally agreed among practitioners and pathologists, that the collection of symptoms named *dysentery* is in all instances to be considered as depending on an inflamed state of the villous membrane, and of the submucous tissue of the colon or great intestine, sometimes with a similar affection of the lower part of the ileum or small intestine. This is the reason why one variety of it has been described by the name of *Colunitis*. I adopt the term *Colonia* as a general epithet expressive of inflammation of the mucous

surface of the colon, and include under it the following varieties.

a. Colonia simplex. Dysentery or Flux of Temperate countries occurring in autumn sporadically.

b. Colonia castrensis. Camp Dysentery, or Bloody Flux, affecting many individuals at the same time in temperate countries.

c. Colonia tropica. Tropical Dysentery, affecting chiefly Europeans exposed to vicissitudes of weather in tropical countries.

a. The first of these varieties of disease is common in sporadic cases in autumn, both in this country and in every country of Europe. In its mildest form, it is attended with griping pains, tenesmus, and numerous fluid stools, chiefly mucous, and occasionally streaked with blood. The pulse is slightly affected, sometimes not at all, and the only symptoms of general disorder are furred tongue, much thirst, dry burning skin, and scanty urine. It is rare, however, that simple dysentery occurs in so mild a form, and the physician has even in this country occasionally to witness and treat a much more formidable distemper. It has been, perhaps, best described by Willan, whom chiefly I follow in the subsequent account.

After exposure to cold or damp air, the individual is affected with excruciating pain at the lower part of the belly, distressing sickness, vomiting generally of green bile, perpetual straining to expel feces, with numerous but scanty evacuations. With these symptoms are associated quick pulse, from 90 to 100 or 120, in the latter part of the day, with some hardness, heat, much thirst and desire for fluids, and scanty high-coloured urine; the tongue is covered with a whitish fur, unless over the *papillæ*, which appear red and enlarged; and the throat is sometimes dark-red. In the progress of the disease these symptoms become more severe. The stools, which at first are fluid and mucous, or clear and gelatinous, but without appearance or smell of proper feces, become mixed with shreds or filaments like pieces of skin, are tinged red, and finally, streaked with blood, or mingled with this fluid in various forms and degrees. Constant straining to evacuate these matters, and perhaps the tender state of the villous surface of the rectum, occasions much pain and distress, with heat and difficulty in making water; the pain of the belly ascends sometimes towards the epigastric re-

gion, and the whole surface becomes tense and sore, so as not to bear pressure without much pain. These symptoms are generally aggravated after each stool, and sometimes periodically for two or three hours every afternoon. The nights are sleepless, feverish, and agitated; the pulse continuing unnaturally quick, with heat, constant flushing of the face, and occasional coldness of the lower extremities. These symptoms continue so long as the alvine discharges are mucous, filamentous, bloody, and without the usual smell; when this last phenomenon takes place, much black dark-coloured feculent matter, highly offensive both in appearance and odour, is generally evacuated. Similar stools may continue at intervals for several days. At length the discharges become of the usual colour and consistence, but occasionally mixed with blood or mucus, when the griping and tenesmus partially return.

The duration of the disease may vary from three to five or six weeks. When the violent grinding pain of the bowels ceases, pain may be felt about the upper part of the thighs, in the shoulders, or arms, or in the stomach periodically. The white fur of the tongue during the primary fever may, in the second or third week of the disease, be succeeded by a shining, smooth, rose-coloured aspect, with slight swelling of the tongue, terminating in apthous excoriations.

In some cases, after the removal of the dysenteric symptoms, hectic fever, with wasting or even dropsy, may supervene, and convalescence take place only at the end of eight or ten weeks.*

In the disease from which this description has been formed, no case proved fatal, so that we have not the evidence of dissection to show, that it was inflammation of the villous surface of the colon which originally gave rise to all the morbid phenomena which I have enumerated. This conclusion, however, is warranted by the pain and griping being felt first in the lower part of the belly, and afterwards in the epigastric region, or, in other words, that it was first the rectum and sigmoid flexure, and finally, the transverse arch, which suffered, by the peculiar character of the matter discharged, without the fetor or aspect of feculent matter, and afterwards by the appearance of true feces,—and by the mode in which the disease terminated. To these marks may be added the resemblance which it bears to ex-

* Willan's Reports of the Diseases of London, 1800, p. 377, of Miscellaneous Works.

amples of dysentery, in which dissection put the nature and seat of the affection beyond doubt. Dr Baillie, however, has left a direct testimony on this point, and informs us that when cases of dysentery occurring during the autumnal season in this country prove fatal, a number of ulcers are found in the inner (mucous) membrane of the great and sometimes of the small intestines. As these ulcers are to be considered not as necessary parts of the disease, but as the effect and consequence of previous inflammation, it shews clearly that the villous membrane at least of the colon, and in some instances of the ileum, becomes inflamed, and afterwards ulcerated in the dysentery which happens under ordinary circumstances in this country.

These ulcers, when they do take place, I have ascertained to be produced in the following manner. When the irritation is first developed, though it affects superficially the colic mucous membrane generally, yet its great intensity falls chiefly on the muciparous follicles of the bowel. These follicles are all of the isolated character in the colon; and in the sound state they are circular in shape, a little more opaque than the rest of the membrane, and present in their centre a minute aperture. When irritated they become raised and prominent, and slightly reddened and vascular; and little doubt can be entertained that in this state they are stimulated to excessive action, and are the source of the abundant secretion of serous or slimy mucus which is often discharged in dysentery. In the early stage of the disorder, it is probable that these follicles are merely irritated or excited to excessive secretion and action. When this irritation, however, is continued or intense, they become the seat of vascular congestion. Their vessels are unduly distended with blood, and the delicate filamentous tissue, by which they are surrounded, swells and elevates the follicles, sometimes into a pustular eminence, sometimes into a broad lenticular tumour. The mucous membrane, unable to resist this distension, gives way at the apex, and discloses a rough depressed surface, the result of the previous inflammation. In some cases this rough surface is confined to the exact site and limits of the follicles; but when the surrounding mucous membrane is inflamed and swelled, that also gives way, and the depressed rough surface is proportionally extensive. The shape of these sores is irregular, and their edges are ragged; but in general their longest diameter lies across the intestine. The ulcers are always rather large when the disease has continued for some time.

b. The camp dysentery differs from the simple or sporadic dysentery, principally in the greater intensity of its symptoms, the greater intensity of the concomitant fever, the more rapid progress of the disease, and its tendency to affect many individuals at the same time.

Both forms of dysentery are liable to be complicated with fever, especially with typhous or malignant fever, and both are liable to alternate with, or be complicated with, rheumatism, to precede and to follow that disease.

In some instances, varieties are observed in the discharges. Thus many authors, especially the German writers, speak of the red or bloody dysentery, as distinguished from the white or mucous dysentery. It appears, that, in certain epidemics, there is a greater tendency to the secretion of blood than in others, probably from greater vascular congestion.

MORBID ANATOMY.—The state of the intestines after death by dysentery has been described by Monro, Watson, Baker, Stark, Pringle, Caille, Hunter, Hopfengartner, Baillie, and Jackson, and their several accounts, with some trifling exceptions, correspond with considerable accuracy. In four dissections made by Pringle of the bodies of persons who died of dysentery in the campaign of 1744 in Flanders, the villous coat of the colon was red or vascular, and abraded or ulcerated; the lower end of the colon, and generally the *rectum*, was in a state termed mortification; the ligamentous bands of the colon are said to be relaxed, half corrupted, or entirely obliterated; and the colon, sometimes the ileum, or even stomach much distended with air.* In the dissection of a man who died of epidemic dysentery in 1762, recorded by Baker, Hewson found the inner or mucous surface of the rectum, colon, and cæcum, and part of the ileum, dark-red or livid, and covered with black bloody mucus. When this was removed by washing, the mucous membrane was found occupied with many hard pustules, irregular, not unlike small-pox, but solid when divided. The peritoneal and muscular coats are said to be thickened.† In the dissection of another dysenteric subject given by Pringle, the same anatomist found certain protuberances of a lighter colour than the rest of the surface, round, about one-twelfth of an inch high, of unequal

* Observations on the Diseases of the Army, by Sir John Pringle. 1774.

† De Dysenteria Epidemica in Sandifort Thesauri, Vol. ii. p. 379.

breadth, and similar to small-pox at the height of the disease ; but differing in this, that they were firm, without cavity or contained fluid. These were found in the large intestines only, where they were as thick as variolous pustules when numerous on the skin. Neither worms, *scybala*, nor purulent matter were found in the intestines ; no water, ulcers, or purulent matter, in the peritoneal cavity.* In a third recorded by Baker, Charleton Wollaston found in the body of a seaman, the villous surface of the lower end of the ileum very red, the outer or peritoneal very black, the cœcum distended with air, the whole colon and rectum much contracted, and their peritoneal coat white. Their whole villous surface was covered with bloody mucus, on removing which it presented numerous hard eminences (*tubercula*,) in one part small, round, and red, in another broad, fungous, and elevated, with sound spots of the mucous membrane interposed. In general, the small red tubercles were in the rectum and lower end of the colon, and red fungous eminences, with round black petechial spots in the upper part of the colon. Neither feculent matter nor *scybala* were found in the bowels ; and the other organs were natural. In the body of another seaman who had laboured twenty-one days under the disorder, the same observer found the cœcum distended with air, the transverse arch distended and perforated with four or five holes, by which a brown fetid matter mixed with *feces* had escaped into the abdominal cavity. This part of the colon, which is connected to the liver, stomach, and spleen, was gangrenous, and precluded full examination. The rest of the tube and the *rectum* were contracted ; their outer or peritoneal coat white ; the villous or inner coat covered with bloody mucus, and presenting fungous tubercles, but neither so numerous, so broad, nor so elevated as those of the other body.† Monro found in those who died of old fluxes at Bremen, the *rectum*, especially the inner coat, inflamed and partly gangrened ; in two, the lower part of the colon inflamed, and livid spots on its arch ; and in one who had been seized with violent pains of the bowels two days before death, the *ileum* red and inflamed.‡ The same au-

* De Dysenteria Epidemica in Sandifort Thesauri, Vol. ii. 1774, p. 246, chap. vi.

† De Dysenteria Epidemica in Sandifort Thesaur. Charleton Wollaston's Letter to Baker, p. 380—382.

‡ Account of the Diseases, &c.

thor, in a subsequent account of the state of the intestines in old dysenteries, describes the inner surface of the rectum and colon as far up as the valve, as covered with a number of black or livid spots of various size, which were occasioned by black blood or other fluids diffused through the cellular membrane situated immediately above the villous coat of the great gut, (submucous cellular tissue;) and states, that generally in the middle of each spot there was more or less erosion of the villous coat; that the villous coat appeared there fine, transparent, and firm, though the cellular membrane was black and inky; and that the muscular was generally of its natural colour. No black spots or erosions of the villous coat were seen in the small intestines, but in one or two, little red spots, or some slight marks of inflammation.*

These statements are shortly confirmed by Frederic L. Bang in the following terms. “*Perlustrata interna facie intestini cœci atque coli, vidimus tunicam villosam alibi adhaerentem et alibi derasam, ibidemque tunicam vasculosam lividam quasi sanguine plenam, mesenterium rubescens vasis distinctis plenissimum.*”—(Selecta Diarii Nosocomii Havniensis, Tom. ii. 1786, July 14, p. 223.)

Hunter states, on the contrary, that he never saw abrasion or mortification of the villous coat; and is inclined to think, that, in the dissections mentioned by Pringle, the black colour arising from extravasated blood was mistaken for beginning gangrene. This is very probable, especially when the description of Monro now quoted is remembered. But it must not be forgotten, that this inflammation of the intestines may terminate occasionally in mortification. Maximilian Stoll, who observed this disease with much attention, informs us, that in the bodies of those who died of acute and rapid dysentery on the ninth or tenth day, he found the *cæcum*, *colon*, especially its transverse arch, and the *rectum*, swelled, thickened, hard and fleshy, of a leaden or dull-red colour, the mucous membrane of a foul or dingy red-colour with blood, and when this was wanting, of a deep rank green tinge, removable neither by washing nor the sponge, and the caul and mesentery tinged with extensive redness.† The last appearance is to be

* Concerning the state of the Intestines, &c. in Essays and Observations, Physical and Literary, p. 518. Vol. iii.

† Ratio Medendi, Pars. iii. Vol. iii. Sectio, iv. chap. iv. p. 280.

ascribed to the progress of elementary decomposition, and indicates at least the commencement of the gangrenous process. But it cannot be doubted, that instances of gangrene of the inner or mucous coat of the *rectum* have taken place, and may happen, though rarely, in dysentery. It has been remarked, especially in the variety to be subsequently considered. These general appearances in the bowels of dysenteric subjects are also shortly noticed by Baillie; but whether he described them from personal observations, from preparations, or from the authorities now enumerated, I cannot say. (*See Morbid Anatomy*, p. 179.)

The appearances now specified are to be regarded as the effects of inflammatory action on the villous membrane of the intestines, especially the colon.

I am not aware that the circumstances, on which the formation of hard pustules or tubercles in the colic mucous membrane depends, have been explained. These bodies were not seen in the camp dysentery of 1743, and but rarely in the tropical dysentery of the east, while they were observed in every case of the London dysentery. Hunter, who saw them in all the dysenteric cases which he dissected in Jamaica, describes them as true *pustules*, though they contain no purulent matter (*pus*); and says they are seated under the villous coat, between it and the muscular, that is, in the submucous tissue. Each pustule is at first small, round, and reddish, not more than the tenth of an inch in diameter; it gradually enlarges, till it attains the diameter of a quarter of an inch, becoming at the same time paler. In this stage, a small crack, with a slight depression, appears on the top, and gradually enlarges; the contents of the pustule are now found to be cheese-like substance; as the opening enlarges, the edges become prominent, the base grows rough, and matter, sometimes tinged with blood, oozes from it. This is the progress of one pustule, or tubercle; but they are generally in clusters, and may coalesce, and form an unequal ulcerated surface, with a hard thickened base. (Observations, &c. by John Hunter, M. D. chap. iv. §. 2d, p. 230, 231.) These hard pustules are muciparous follicles, enlarged, indurated, and hypertrophied by the process of inflammation, subacute and chronic.

From these facts, I infer that the intestinal mucous membrane is liable, at least, to two kinds of inflammation; from

either of which dysenteric symptoms may arise. The first of these is the spreading, or continuous, which affects chiefly the mucous membrane in general, and is always acute at the commencement, but may become chronic, causing either roughening, thickening, or ulceration. The second, though affecting the colic membrane generally, is, however, principally seated in the muciparous follicles of the colon, which are raised into vesicles, or hard pustules, or tubercles, and is for the most part chronic; but it may be combined with the acute. The long continued congestion, doubtless, may elevate the muciparous follicles into hard, tubercular, warty-like eminences, or convert them into chronic pustules, or ulcers, according to circumstances.

In the epidemic of 1825 in Dublin, the mucous membrane of the colon was very generally covered by large masses of lymph; ulceration was also common; and serous fluid was generally effused within the cavity of the peritoneum.

c. Tropical Dysentery—This disease was first described, as it occurs in the West Indies, by Dr John Hunter, and then by Moseley, who represented it as inflammation or fever turned on the intestines, like Sydenham; and since that time correct and full descriptions of it have been given by Chisholm, Ballingall, Bampffield, Johnson, Marshall, and Twining.

It appears that there are two distinct varieties of this disease observed in India, one consisting in acute inflammation of the mucous surface of the colon (*Colitis*), the other more chronic in its course and more extensive in its situation, termed *Hepatic Flux*.

The first variety generally commences like common *diarrhœa*, with occasional griping pains of the bowels, frequent and unseasonable calls to stool, and an irresistible inclination to straining (*tenesmus*.) The evacuations are generally copious, fluid, and without peculiar fœtor; they may be feculent, streaked with blood, or bloody without fecal matter. At this time the pulse is seldom altered; the heat of skin not much increased; and the appearance of the tongue may be little changed. The patient, however, complains of great corporeal weakness and depression of spirits, with loss of appetite and urgent thirst. These symptoms are followed by more or less acute pain of the hypogastric region, sometimes extending to the iliac regions or flanks, where it is urgent; and sometimes along the

whole course of the colon, with a sense of tension and tenderness on pressure; while unusual heat of the integuments may be felt by applying the hand to the surface of the belly. At the same time the evacuations become more frequent but less copious, consisting chiefly of blood and mucus, or bloody serum, which has been aptly compared to water in which beef has been soaked. The obvious symptoms are, painful suppression of urine, distressing *tenesmus*, and increasing indifference to solid food, while there is an uncontrollable desire for fluids, especially cold, which the patient swallows with avidity, though impressed with the idea that it may be hurtful. The tongue may be white and furred, or florid, and of glassy smoothness, as in hectic, with a tremulous motion when thrust out. The skin is either parched with biting heat, (*color mordicans*), so as to affect the fingers, or covered with profuse perspiration. The pulse may still be little affected; but sometimes it is slightly quicker than natural; in other cases it is merely full and tense, with a thrilling sensation under the fingers.

This state of the pulse denotes extreme danger, and shows that the disease is rapidly proceeding to the final stage, in which the lassitude and dejection so conspicuous throughout are converted into anxiety and fear of death. The patient frequently shows an inclination to dwell on symptoms, which, to a spectator, appear of little importance. The discharges, which are frequently involuntary, are intolerably fetid, and may be mixed with shreds of membrane and quantities of purulent matter; the rectum may be protruded, and a portion of its inner coat, several inches in length, has been discharged mortified. From this state recovery, though it has been known to occur, is rare; the pulse becomes weak and small, or sinks; pain ceases, and hiccup with vomiting distresses the patient. He becomes delirious, his features shrink (*facies Hippocratica*;) foul viscid mucus, (*sordes*,) collects about the teeth; the skin is covered with a cold clammy sweat, and the body exhales a cadaverous smell; flies crowd round the patient, and his loathsome existence is at length terminated.

This acute form of the disease is most frequent in young robust Europeans who have newly arrived in India.

The second or chronic variety of tropical dysentery, Hepatic Flux, is incident to men who have been some time resident in the country, and who, from habit and constitution, are less liable to inflammatory diseases, but more prone to disordered states

of the biliary secretion. Like the former it commences as an ordinary attack of diarrhœa, and is afterwards characterized by frequent and severe fits of griping, like colic pains near the navel, each of which is succeeded by a call to stool. The discharges are from the first always unnatural in colour, varying from the darkest inky hue, to the different shades of green and yellow, mutually alternating. The stools, which exhibit a frothy appearance, are voided with copious discharges of wind, and with a sense of scalding about the anus. Each evacuation is followed by relief, which the patient expects to continue; but the griping, with the sense of air moving in the bowels (*borborygmus*,) are soon succeeded by a call to stool with the same painful sensations.

From the commencement of the attack, the patient complains of more or less squeamishness, loss of appetite, and preternatural thirst, with a disagreeable taste in the mouth; the tongue is furred, and not unfrequently covered with a yellow mucous crust; the pulse is quickened, and the skin is parched and hot. When these symptoms have existed for some days, the stools become of a whitish colour, are mixed with portions of half-digested aliment, and are passed with painful straining. In this state the disease is termed by the soldiers the *White Flux*. The griping pains continue, sometimes with permanent oppression at the epigastric region, or even hysteric strangulation. Squeamishness and loathing of food with hiccup and bilious vomiting are very distressing; thirst is extremely urgent; weakness and lassitude increase as the flesh is lost; the pulse continues quick; and the skin often communicates a greasy sensation to the touch.

Under these symptoms, modified by peculiarity of constitution, season, and local situation, the patient may labour for weeks or months, while the flux injures the constitution irreparably, and wastes the strength by its long duration. Yet it does not of itself generally prove fatal, but may either terminate in recovery by gradually and spontaneously exhausting itself; or in abscess of the liver or ulceration and mortification of the colon, either of which may be fatal. Hepatic abscess is to be watched for by its characteristic signs; ulceration of the colon may be apprehended by the appearance of blood in the stools, and the other symptoms already enumerated.

It is in the acute form of tropical dysentery chiefly that we possess correct information on the state of the intestines after

death, and the changes operated by the disease. They are as follow. Serous fluid sometimes mixed with coagulable lymph is found in the cavity of the peritoneum; the caul (*omentum*) is shrunk, and firmer than natural, sometimes doughy, with slight adhesions to the intestinal convolutions; in other cases, chiefly when the disease is protracted, and complicated with liver disorder, it is shrivelled, transparent, and entirely destitute of fat; the stomach is seldom altered in appearance or structure; the small intestines may be perfectly sound, with the exception of slight inflammatory patches toward the lower end of the ilium, to which the adhesions of the omentum are attached. When the small intestines are cut open, fetid air escapes; but the villous surface rarely presents any thing peculiar. The great intestines show marks of inflammation in all stages; in some parts, a slight inflammatory redness externally, others very livid, in others, especially the cæcum, and sigmoid flexure partly destroyed, so as to permit the escape of air, or even feculent matters into the peritoneal cavity. The epiploic appendices are diminished, and converted into jelly-like bodies, when the disease is long, and complicated with liver affection. The cells of the colon may be obliterated, and the coats of the intestine thickened, yet brittle, and lacerated. When the gut is slit open, fetid air escapes; the villous surface, when cleaned of the bloody mucus with which it is covered, may be abraded, or ulcerated, or in some instances occupied with hard pustules; the colic tissue is much thickened and firm; extravasated grumous blood is sometimes found; fluid *feces* of natural colour in the upper portion of the colon; but very seldom hard or lumpy feces. The liver may be sound; or unusually small and hardened; or enlarged and hardened; or the bile may be thickened. Abscess is rare. The other organs are unchanged. This description is in general confirmed by Bampfield.

I have entered into this detail of the history and morbid changes observed in the forms of dysentery to illustrate the pathology, or what Cullen termed the *proximate cause* of the disease. He considered this as obscure; and particularly regarded the supposition of an acrid matter received into, or generated within, the bowels as inadmissible. From observing that the natural excrements were rarely voided, that if voided, they were discharged in the shape of hardened balls or lumps, and that in dissections of dysenteric patients, when the form

and texture of the bowels were not utterly destroyed, considerable portions were much contracted, he was led to infer that the prominent cause, or its chief part, consists in preternatural constriction of the colon, occasioning the spasmodic efforts felt in severe gripings, and lower down, the mucous discharges and tenesmus, and that, at all events, the hardened excrements retained in the colon are the cause of the griping, frequent stools, and tenesmus.

This explanation is erroneous and insufficient. The contraction of the great intestines, observed in dysentery, is one of the morbid effects; but is not the cause of the disease. The hardened *fæces* may be expelled, without removing the griping, frequent stools, and other symptoms, as is particularly seen, both in the dissections of the London epidemic dysentery, and the disease of tropical countries. Mr Marshall informs me, that in many dissections of persons cut off by dysentery in Ceylon, he never recognized any appearance of scybalous or hardened *fæces*. They are accidental effects of the morbid action which are now to be considered.

The changes which I have described above, as found in the intestines of persons who have died of dysentery, are all of them effects of inflammation; and that this inflammation commences in the mucous or villous membrane of the colon, and spreads over it at various rates, and with various effects, but always so as to give rise to the symptoms named *dysentery*, all the phenomena of the disease tend to demonstrate. The chief peculiarities of this inflammation are, 1. that it is confined with considerable accuracy to the colon, or great intestine, the *ileum* being but very rarely affected; 2. that it spreads along the mucous or villous membrane continuously, and rarely shows any tendency to affect the submucous tissue, or the peritoneum, till the termination of the disease; 3. that though it generally commences with disorder of the circulation, it may commence without this, and almost always goes on, when once established, without the pulse being much quickened, until the inflammatory process either affects the submucous tissue, or begins to terminate in mortification of the mucous tissue.

The operation of inflammation, as the primary agent in causing all the other changes and symptoms of the disease, is so obvious, that it scarcely requires explanation. Either directly, as an unnatural stimulus, or indirectly, through the quantity of blood and mucus discharged from the membrane, it

gives rise to the irregular and violent, yet ineffectual peristaltic motion which constitutes the griping and *tenesmus*. The hardening and thickening of the colic tissue, and the contraction of the bowel, are effects of the same morbid process long continued.

When the inflammation does not prove fatal, it often causes, in this manner, a permanent contraction of part of the colon, or more usually of the rectum, forming intestinal stricture. This I have seen more than once in the persons of those who had suffered attacks of tropical dysentery, from which they had not perfectly recovered. Occasionally, albuminous, or slimy secretions take place, from the ileal or colic membrane thus diseased.

Dysentery may terminate, 1. in resolution or health; 2. in destruction of the intestinal tissue and death; 3. in other diseases. The termination by resolution occurs either in the mildest forms of the disease, when it is sporadic, and when it is judiciously and energetically treated. It consists in resolution of the inflammation of the colic mucous membrane. Termination by destruction of the intestinal tissue will be understood from the account already given of the appearances on the bowels after death. It may take place either in the form of ulceration, acute or chronic; of tubercular destruction and ulceration, or of mortification. Dysentery may terminate in enteria, in enteritis, in that intestinal disorganization which gives rise to the symptoms termed lientery (*λειεντερία*), slippery bowels,) in chronic dysentery, and in dropsy, general and abdominal.

ETIOLOGY.—The causes of dysentery are not well ascertained. It has been remarked by almost all observers, that it is an autumnal disease; that it is frequent in summer and autumn, after considerable heats have prevailed for some time, and especially after very warm and very dry states of the weather; and that the disease is much more prevalent in warm than in cold or temperate countries. It must be noticed, however, that dysentery is nowhere so common as in countries which abound in marshy or wet land; that it is very common, both in temperate and tropical countries, soon or shortly after heavy rains; and that instances of its occurrence in sporadic cases, at least, during cold wet seasons, are by no means uncommon.

If we compare the history of the different dysenteric epidemics that have prevailed, from that of Harfleur, at the siege of

which it was computed Henry V. lost at least 25,000 men in six weeks, to the recent epidemics of the eighteenth and nineteenth centuries,—if we consider the epidemic of Nimeguen, as described by Degner, that of Zurich, as described by Zimmermann; the accounts of the London epidemics given by Willis, Sydenham, Morton, Akenside, Baker, and Willan, and the epidemics of the camp, as described by Home, Pringle, Monro, and Jackson, we shall find that the following conclusions naturally result from the whole of the facts afforded by them.

First, dysentery appears in the same countries and in the same seasons as ague and remittent fever; and of a number of persons exposed to the causes, some shall have ague, or fever, others may have dysentery; or fever may precede dysentery in the same individual; or dysentery may terminate in ague or fever; or may be combined with it in the same individual.

Dysentery may be generated in moist countries in the summer or autumnal months, whether the weather be dry or wet; and while large bodies of human beings, if exposed either to heavy rains, or night-dews, with insufficient shelter, are very liable to be affected with it. The great and sudden transitions from extreme heat during the day to excessive cold during the night in tropical countries, is a fertile source of dysentery, sporadic or epidemic. Whether the effectual operation of these causes in producing the disease requires the co-operation or previous influence of others residing in the persons of patients, we have no means of ascertaining. It is not unlikely that various disorders of the alimentary function, various unknown unhealthy states of the gastro-enteric membrane and its secretions, and certain states of the cutaneous circulation, are particularly favourable to the operation of the agents alluded to above.

Some authors have expressed an opinion that the use of fruits, especially immoderately, may give rise to dysentery. There is no doubt that the immoderate use of any article of food or drink must derange the alimentary function, and, by weakening the general strength, render the system more susceptible of the influence of morbid agents. It has been well remarked by Pringle, that dysentery prevails where no fruit has been eaten; and that the disease ceased about the first of October, when the grapes were ripe, and so abundant in open vineyards, that the men eat what quantity they pleased; and Tissot adduces instances in which the use of grapes and other ripe fruits were not only preservative but remedial. The effect of vegetable

acids, however, is ambiguous, and is generally remarked to be injurious.

There is no evidence whatever for the opinion adopted by some moderns from the ancients, that dysentery depends on morbid or changed states of the biliary secretion. When this secretion is deranged in dysentery, it is an effect, not a cause of the disease.

Sennert, Bontius, Cardiluccius,* Morton, Vogel, and Degner believed dysentery to depend on a contagious poison; and in this opinion they have been followed by Rogers, Pringle, Tissot, Zimmerman, Geach, Cullen, and others of less note. The principal arguments by which this opinion has been supported are the following. 1. When the disease appears in towns, camps, or large buildings, it is observed to affect many at the same time, and in succession. Nurses in hospitals, for instance, are observed to be attacked by the disease. 2. Persons frequenting the same latrines with those already affected have been stated to be attacked by the disease;—at least Pringle thought he witnessed instances of communication in this manner. 3. When the disease appears in towns, it is said to prevail more in certain localities than in others. Degner especially states that he traced it from one house in Nimeguen over a whole street.

The opinion here advanced, however, is not quite free from objection, and, in opposition to it, considerable evidence has been adduced by various authorities. It is, in the first place, to be observed, that neither Sydenham, Cleghorn, Akenside, nor Huxham, make any mention of contagion as a cause of the prevalence of the dysenteric epidemics which they observed; and several authors, as Le Poix, Barbeck, Richter, Baker, Stoll, Dr John Hunter, Moseley, Matthaei, and Milne, positively deny that the disease is contagious. Maximilian Stoll observes, that, while dysentery prevailed in 1776–7–8–9 at Vienna, neither physicians, physicians assistants, nor other attendants caught the disease; though they were in the daily habit of examining every morning the discharges of the patients and inhaling the most fetid and disagreeable effluvia; and though he admits that the air contaminated by these discharges might generate putrid or bad diseases, it is inconsistent with his observation, that these exhalations ever produce dysentery. (Cap. viii. p. 328.) Accord-

* Von der Austeckenden und Lagerseuche und Rothen Ruhr u. s. w. Nurnberg, 1684.

ing to Hunter it was not infectious in the hospitals in Jamaica, nor in the epidemic of London in 1779–80. Moseley informs us that he never saw an instance of infection or contagion in dysentery; and Willan asserts, that neither in that of 1800, nor in any previous, did it appear to be communicated by contagion. It seems, indeed, to be clearly established, that dysentery, if proceeding from exposure to telluric *miasmata*, as ague and remittent fever, are, like them, in warm and tropical countries, void of contagious character; and this is particularly the case, providing the disease be complicated with, or terminate in, either of the fevers now mentioned. The opinion of contagious propagation in tropical dysentery is very generally disbelieved by all the recent authorities on that subject. It must be concluded, indeed, that the epidemic prevalence of dysentery depends on the simultaneous operation of certain general causes on numerous bodies of human beings, who are placed in similar circumstances; and if it be ever communicated by contagious propagation, it appears to be only when it is complicated with contagious fever. (See Dr Harty's Treatise, where this question is fully investigated.)

The most important circumstance in the history and etiology of dysentery is the comparative diminution of its frequency in London during the last 150 years. From the bills of mortality previous to the commencement of the eighteenth century, it appears that it was not only very prevalent, but formed a large proportion of the annual deaths. Previous to this time, it appears that the average annual mortality for 25 years from 1667 to 1692, amounted to above 2000. But after the commencement of the seventeenth century, a rapid and great diminution took place, and at the close of the eighteenth and beginning of the nineteenth century, the average annual mortality did not exceed 20.

Of this reduction, there are two modes of giving an explanation. The prevalence and mortality of dysentery might depend on its being associated with malignant fever, and upon its being aggravated, if not produced by all the circumstances of ill-aired and confined abodes, filthy habits, and general disregard to hygienic rules, which we know prevailed at the close of the seventeenth and beginning of the eighteenth centuries. Or secondly, the prevalence and mortality of dysentery might depend on telluric *miasmata*, and connection with intermittent and remittent fevers, which we have the testimony of Willis,

Morton, and Sydenham, were then not only exceedingly prevalent but very fatal. It is superfluous to remark, that, at present, miasmatic diseases are little known in London.

TREATMENT.—The general principles to be observed in the treatment of dysentery may be easily understood from the pathology of the disease already delivered. Their application to particular forms requires some discernment and modification. The remedies which are calculated to abate inflammation, or to obviate its effects, whether general or local, are those which are most effectual in removing dysentery. The peculiar characters of this inflammation, however, require certain conditions to render these remedies appropriate and successful. Neglect of this principle made Cullen declare, that the treatment was fluctuating and undetermined among practitioners.

In simple dysentery it is not always requisite to have recourse to blood-letting; and, indeed, Willan states, that he found no advantage to result from the repeated application of leeches to the belly. It is chiefly when the pain of the belly is acute, the pulse quick or full, and the discharges much mingled with blood, that benefit is to be expected from this remedy, or from a full bleeding at the arm. I must say, however, that even in the sporadic cases of this country, I have found blood-letting repeated, if requisite, to be the most effectual remedy in removing all the symptoms, and abridging the duration of the disease.

The remedies next in effect are those which act on the skin. With this view Dover's powder (*pulvis ipecacuanhæ et opii*) may be given in the usual doses, or thirty minims of solution of muriate of morphia, with half a grain of tartar emetic, may be given every evening, and occasionally, as griping, loose stools, &c. may require during the day. This mode of exhibiting opium in dysentery generally obviates the objection stated by Cullen against its use, viz. that of interrupting the action of the small intestines. This inconvenience is further surmounted by exhibiting moderate doses of such purgative medicines as produce a slow but sure action of the intestines. Of this kind are sulphate of magnesia, castor oil, and, according to Willan, calomel. Cullen was of opinion that, whatever laxatives produced an evacuation of natural *fæces*, and consequent remission of symptoms would be sufficient to effect a cure; and for this purpose he found none more proper or convenient than tartar emetic given in small doses, and at such intervals as to determine their operation chiefly by stool.

In short, he was led to think that the chief benefit was to be expected from remedies of this kind, and that even ipecacuan produced no advantage, unless when it was attended with the same effect. When the symptoms lead to this practice it is most effectual to give a full dose of an opiate, or of an opiate sudorific at bed-time, and a purgative or laxative medicine in the morning. When the gripings are frequent and severe, they may be relieved by the warm bath, the hip-bath, or fomenting the belly. Fomentations, Willan found sometimes detrimental.

In the treatment of the camp and tropical dysentery a more active course of treatment is requisite. The first measure consists in the use of venesection, as the direct means of controlling inflammatory action. Both Pringle and Monro bled freely with great success in dysentery at the commencement of the disease; the former because this malady was partly inflammatory and accompanied often with sizzly blood,—the latter, if the patients were strong, and complained of sharp pain of the bowels, without being discouraged by the low quick pulse which often attends the disorder. The propriety of the practice has been confirmed in modern times, notwithstanding the cautious doubts of Cullen; and it has been found especially in tropical dysentery, that, whatever be the nature of the accompanying fever, blood-letting is not only the most powerful and certain remedy, but is generally quite indispensable. In those rapid forms of enteric inflammation the conduct of the practitioner must be decided by this consideration,—that, if the disease be curable, it is so by blood-letting only. Twenty or twenty-five ounces of blood from the arm, repeated if the griping and discharges do not cease, should be taken from an adult; and its effect may be aided by the application of leeches to the belly. In cases in which it seems unsafe to try a general bleeding, this mode of detracting blood, or by leeches to the fundament, ought not to be omitted.

Next to the direct means of controlling inflammation, are those subsidiary measures to be found in remedies which act on the cutaneous secretion. Sudorifics have long been used as remedies in intestinal complaints, especially with unusually frequent discharges; and while Sydenham was led on this principle to exhibit his laudanum liberally, Friend ascribed the sanative powers of ipecacuanha in dysentery to its operation on the skin.

This drug has been long believed to possess powers almost

specific in the treatment of dysentery, especially the rapid and severe form of the disease prevalent within the tropics; and it has been one of the most common remedies employed by physicians during the last two centuries. For the first knowledge of its therapeutic effects in this disease, and, indeed, in all intestinal discharges, the profession is indebted, first, to an anonymous Portuguese author, supposed to be Manoel Tristaon, who, in 1625, strongly recommended the remedy, and afterwards to William le Poix, who found it in common use as an antidysenteric agent in the native practice of the aborigines of Brazil. As dysentery, hepatic flux, and inflammation of the rectum, were in that country not only endemial, but violent and severe, he found it, next to blood-letting, the most prompt and efficacious agent; and as such, made its virtues known in 1658 to European physicians.* It was soon tried very extensively by various physicians, and testimonies in its favour were given by Lentilius Rosinus, Pomet, Marcgrave, Sir Hans Sloane, Bolduc, Marais, Leibnitz, Vater, Hillary, Lind, Desbois, and Helvetius; and it has since, either alone or with other agents, either as an emetic, a nauseating, or a diaphoretic medicine, formed the basis of almost all the therapeutic methods employed for the cure of the different forms of dysentery.

The physiological and the therapeutic effects of the drug vary according to the mode in which it is exhibited. At the commencement of the disease, it may be given as an emetic in the dose of from fifteen to twenty grains, when it produces vomiting more or less complete, and afterwards relaxation of the skin, and abatement of the number of fluid motions. It is, however, believed, that this mode of exhibition is not well suited to the subsequent course of the disease, as vomiting is said in some cases to aggravate the sufferings of the patient. Moderate and rather small doses are believed to be more useful and efficacious in abating the intensity of the symptoms, and shortening the course of the disease. Either it may be given in substance in doses of from one to three or four grains once or twice daily, or an infusion may be made of the root, and small quantities of this may be taken at such intervals as will produce mere squeamishness and sickness, but not vomiting.

Of the efficacy of the former method in controlling the violence of tropical dysentery, we have numerous pointed testi-

* Gulielmi Pisonis, *Med. Amstelaedamensis de Indiæ Utriusque Re Naturali et Medica*, Lib. xiv. Amstelaedami, 1658. Folio, Lib. ii. cap. ix. xiv.

monies by Mr Boag, Dr Balmani, Dr James Clark of Dominica, and others; but perhaps one of the strongest is furnished by the experience of an individual not belonging to the profession, in the case of the rapid and fatal form of the disease which prevails on the coast and banks of the rivers of West Africa. Captain J. Cardin, who had made several voyages to that coast, found, that in trading on the river Senegal in 1784, his officers and men were most severely affected by this disease, and many of them were reduced to an extreme state of weakness and emaciation. From recollection of the virtues of ipecacuan, he was led to make trial of it; and within one month restored his whole crew. In subsequent voyages, he was not less successful; and, though most of his crew were at each voyage attacked so as to be quite unable for duty, yet, by the timely administration of the ipecacuan, he was never disappointed in recovering them.

The mode of administration was by giving four grains of the powder in a cup of weak tea, with fifteen or twenty drops of laudanum on going to bed. This was followed by sickness, but not vomiting, and much alleviation of the pain. Next morning, if the patient continued easier, the dose was reduced to three grains, and then to two, morning and evening, which, with diet consisting of rice-gruel, was continued till all the symptoms of the disease were subdued.*

The same remedy was found not less efficacious in a different form by Dr James Clark of Dominica, who was in the practice of treating the dysentery of the Caribbean islands by the infusion prepared by infusing two drachms of ipecacuanha root in eight ounces of boiling water. Of this the patient was directed to take a single ounce every second or third hour; and in the course of a day or two the motions generally became less fluid and frequent, the skin became moist, and natural feces were discharged.†

Both methods of exhibition have their advantages. In general, small doses of the powder, as one or two grains twice or three times daily, are best suited for most cases of acute dysentery. The infusion is most applicable to cases in which there is little sickness at stomach. Both methods have been employed with advantage in the disease as it appears in the East Indies, by Mr Twining, Mr Leslie, and others.

* Memoirs of the Medical Society of London, Vol. iii. p. 517. London, 1762.

† Treatise on the Yellow Fever of Dominica. London, 1797.

It is, however, important to observe, that ipecacuanha is not always equally efficacious; and it is invariably rendered more powerfully sanative by being preceded by a blood-letting, where there is much pain or quickness or tension of the pulse.

Ipecacuan operates as an antiphlogistic, both by preventing the patient from eating, and by determining towards the surface. It furnishes the means, in short, of giving rest to the irritated and inflamed intestine. The same object may be accomplished by other means, especially by antimony.

It is to Moseley, however, that the merit of demonstrating the value of this as a therapeutic principle is due. He had an idea that the morbid humors were to be carried off from the intestines by revulsion towards the surface; and with this view he was in the habit of giving laudanum and antimonial wine, James's powder, or glass of antimony till they caused copious and continued sweating. It is immaterial what name be given to the natural process thus instituted, or by what individual sudorifics it be accomplished. The object is to produce sweating, and any medicine by which this is affected with certainty may be given. Dover's powder has attained much reputation in India of late years; it is perhaps the most uniform in its action, and the most easily manageable. In violent cases two, three, or four grains of solid opium have been given, and followed by the exhibition of two or more ounces of an infusion of ipecacuan. With the same effect a combination of antimonial wine and laudanum, of antimonial powder with solid opium in the form of pill, or even James's powder in the usual dose, may be given. It is needless to say, that during the operation of either of these medicines, it is indispensable to defend the patient from cold, moisture, or vicissitudes of weather. Sudorifics are suited to every stage and degree of dysentery.

To this head may be referred the warm bath, fomentations, and every mode of applying warm water. The bath is useful in allaying the pain and griping, promoting sleep, diminishing the frequency of the stools, and in promoting the discharge of urine with abatement of pain.

Emetics appear to exercise no effect on the disease, unless when they produce sweating. In general mere vomiting aggravates the sufferings of the patient, and should never be resorted to unless to palliate particular symptoms. If the patient is squeamish, or affected with spontaneous vomiting, the warm bath, succeeded by an opiate, is the best remedy.

Purging was much employed by Pringle, who used for that purpose calomel and rhubarb; Monro had great confidence in gentle purges, using the saline medicines at the commencement, and rhubarb, with calomel, in the advanced state of the disease; and Baker thought there was no hope of curing the disease till due purging was performed for the purpose of expelling hardened fæces, and restoring the natural state and secretion of the intestines. Cullen adopted the general principles of these opinions, but modified their individual application in condemning rhubarb as the most improper of all purgative medicines in the treatment of dysentery.

These principles, which have been adopted by most succeeding physicians, didactic or practical, are partly right and partly wrong; and should be qualified according to the sound pathology of the disease. In the *first* place, when the intestinal mucous membrane is acutely inflamed, the action of those stimulating substances which physicians use as purgatives is ambiguous, and may be injurious. *Secondly*, the circumstance of hardened feces is not uniform and constant in dysentery, and is often wanting in the most severe and dangerous forms of the disease. *Thirdly*, when they are present, they are not a primary cause of the disease, but an occasional effect of the morbid state of the colic mucous membrane; nor are they in all cases removable by purgatives, but frequently come away spontaneously, or rather as an effect of the disappearance of the morbid condition of the colon. *Fourthly*, the vitiated humours, as they were termed, or the morbid secretions, are the effect, not of fecal matter retained in the colon, but of inflammation of its mucous membrane. For these reasons, the utility and expediency of purgative medicines in treating dysentery may be doubted; and it has been accordingly ascertained by those practitioners who have had to contend with the most violent and severe forms of the disease, that purgatives did not procure that complete and effectual relief which they were led to expect. It is not understood by this that the use of these remedies is to be utterly proscribed, but merely that they be put under such restrictions and regulations, as may insure their safe and beneficial operation. On the whole, the employment of purgative medicines in dysentery may be restricted to the following circumstances. Purgatives should not be exhibited when griping is severe, tenesmus painful, or the stools frequent and bloody, until venesection is performed. A very mild laxative,

as castor oil, or infusion of senna, with manna, may then be given, in order to expel if possible any feculent matter retained in the intestines, and to show what is the nature of the discharges procured by artificial means. If no lumpy or unhealthy fæces are thus discharged, it is seldom expedient to repeat the evacuation, as it too often aggravates the griping, tenesmus, and bloody discharges. When the urgent symptoms of abdominal pain, frequent loose stools, with griping and excoriation of the rectum have been alleviated by blood-letting, sudorifics, and the warm-bath, gentle laxatives may be used to prevent any foul or noxious secretions or excrement from remaining in the bowels. During convalescence they are to be exhibited as in convalescence from other diseases.

Before the inflammatory nature of dysentery was well understood, physicians were in the habit of trying the effects of various medicines in controlling a disease so generally unmanageable; and among others were led to have recourse to mercury. It was sometimes found successful, and occasionally cured cases of flux which seemed to resist every other remedy. In consequence of this partial success, which was owing either to the stage of the disease, a peculiar form of it, or, in short, to the restraints as to food and exposure, to which patients under the use of mercury were subjected, its employment has been indiscriminately transferred to every form of the disease. This remedy has been exhibited in two modes, either by giving the blue pill, or rubbing ointment until salivation took place, or by the exhibition of large doses of calomel amounting to a scruple or more, repeated until the alvine discharges diminish and the pains abate. In both forms, but especially the last, which has been emphatically named the *scruple dose practice*, mercury has been considered a specific, and it has been thought, that, if duly administered, every other remedy might be neglected. This is not the place to enter into a minute disquisition on its merits. But if we reason from the pathological process in which the disease consists, in our choice of remedial measures, mercury, and especially mercurial salivation, will be the last to which we should have recourse. The mucous membrane of the colon is extensively inflamed, and every irritating application aggravates the sufferings of the patient, and the severity of the disease. Mercury, when used even to a small extent, and always when employed in great quantity, is often succeeded by painful griping, frequent mu-

cous or bloody stools, and all the symptoms of transient inflammation of the bowels. It is therefore by no means reasonable to expect that it will prove a remedy in dysentery; and we accordingly find, that all practitioners who have seen the disease in its aggravated form agree in condemning the use either of mercury to salivation, or of the scruple dose exhibition of calomel.

Injections furnish a very useful sort of remedies. They are local applications, which may be varied according to the symptoms, and the state of the colic membrane, and the membrane of the *rectum* thus indicated. In mild cases, where the chief complaints are frequent mucous stools, with griping and tenesmus, the ordinary anodyne glyster of starch and opium is the best. In India, rice gruel (congee water,) is substituted for the starch. Where there is much pain, solutions of acetate of lead, decoction of bark, seneka-root, or any other vegetable astringent may be injected, either alone or with the anodyne glyster. When copious hemorrhage continues after blood-letting, oak-bark, alum, or white vitriol, may be injected with benefit.

To conclude, the treatment of dysentery, either of the camp or of tropical countries, should be conducted on antiphlogistic principles entirely; and of these, blood-letting, sudorifics, the warm bath, and occasional doses of the mildest laxatives, are the most expedient.

The treatment of hepatic flux is somewhat different. It is chiefly a chronic disease, and is said in general to be connected with disorder in the circulation and secretion of the liver. According to the observations of experienced practitioners, this disease may be certainly cured by the exhibition of mercury, and such use of purgatives as is sufficient to obviate costiveness or retention of feculent matter. The first remedy is said to be most conveniently administered in the form of blue pill, two or four, = ten or twenty grains, of which may be given daily. Salivation is unnecessary and never useful. It may also be exhibited in the form of calomel conjoined with opium to prevent griping, and too violent action on the intestinal mucous membrane. Of purgatives, the mildest are the best. Castor oil, infusion of senna, Epsom salts, or aloes combined with calomel, will generally be found to operate without aggravating the intestinal pains. When the skin is hot and dry,

the warm bath, with two or three doses of Dover's powder, from ten grains to one scruple each, or of antimonial wine and laudanum, will be found of much service.

In every form of dysentery, and indeed in every stage of inflammation of the mucous membrane of the intestinal canal, the utmost attention ought to be given to the state of the process of digestion, and the condition of the skin. For this purpose, the diet and clothing of the patient must be regulated with the most sedulous vigilance. Without this, the exhibition of medicines is utterly useless and unavailing; and very often the best medical treatment is rendered abortive. On the contrary, where the food and clothing of the patient are attended to, the disease may sometimes subside without other means. In regulating the food of dysenteric patients, attention is to be given to the stage and degree of the disease. At the commencement, when every symptom of inflammation is present, low diet, and abstinence from wine, fermented liquors, and all stimulating substances, must be rigorously enjoined. When the stools have become less frequent, hemorrhage ceased, and griping is abated, the strongest food should be the farinaceous grains boiled with water, whey, or diluted milk. Barley, rice, flour, or oatmeal well dried may be used. Flummery, arrow-root, sago, or salop may be prepared in the usual way, and eaten with fine sugar. If the disease still continue on the decline, the ground rice pudding with a single egg may be used for dinner; but this is the utmost indulgence that ought to be permitted, until every trace of active disease is gone. If the intestinal membrane be sound, the patient will recover flesh and strength under this management; and if it be still inflamed, no food whatever, however nutritious, will do good. When this mode of diet has been continued long enough to show, that it is not injurious, and if the bowels do not again become irritable, animal matters in the form of soup may be conjoined with the farinaceous diet, and afterwards solid animal food, as the medical attendant sees fit.

The subject of clothing is easily determined. The patient should be clothed in flannel if his skin will bear it; if not, a broad roller of flannel should be applied round the belly.

*Cystidia Cystirrhœa, Catarrkus Vesicæ. Catarrhe Vesicæ.
Cystic Catarrh.*

The mucous or inner surface of the bladder may be the

seat of inflammation, either over its whole extent, or at a single spot. The part most frequently affected is the neck of the bladder, and the space termed *cystic triangle*;—a circumstance which has been ascribed to one of two causes. The first of these is, that the neck is the most usual seat of mechanical obstructions to the passage of the urine, and is thus most likely to be first affected with the irritation which connects injury and inflammatory action. The other is, that its contiguity to the urethra renders it liable to be first affected by inflammation of that canal when disposed to spread, or, when in consequence of bad treatment, chronicity, or other causes, urethral inflammation becomes an exciting cause of cystic inflammation. From either of these causes, inflammation may be developed in the cystic mucous surface next the neck of the bladder, and may thence be propagated over a considerable extent, or the whole membrane. The membrane, then, which in its natural state is pale, smooth, and without vessels, becomes red, villous, highly vascular, and much swelled, with occasional spots of extravasated blood. In general the character of this inflammation is to spread, and in ordinary cases it does so without affecting the submucous or other tissues. Instances, however, have occurred in which it has passed successively to the submucous cellular membrane, to the muscular, and thence to the peritoneal coat, or the contiguous organs. In the spreading form, the inflammation is soon attended with secretion of thick mucus or puriform fluid, which falls to the bottom in the urine.

The symptoms of inflammation of the cystic mucous membrane vary according to the part affected. Pain in the region of the organ, heat, difficulty and pain in voiding the urine, which is very scanty and high-coloured, are general symptoms. When the urine is entirely suppressed, with tenesmus, the neck of the bladder and the cystic triangle are affected. If the inflammation be severe or extensive, sickness, vomiting, faintness, and delirium, are common symptoms. The pulse is always more or less affected, the skin is hot, the tongue dry, and the thirst intense. The duration of these symptoms is various in different individuals, but the disease is rarely shorter than three, or longer than ten days.

It may terminate in resolution or health, in suppuration with destruction of the coats, or ulceration, or lastly, it may pass into the chronic state.

The manner in which the two first terminations are effected is in every respect similar to these processes as they take place in other mucous surfaces. The second, or ulceration of the mucous and other tissues of the bladder, is not uncommon. It may occur under two forms. Either it may be superficial, and remove the whole inner or mucous membrane, so as to expose the muscular layer as if it had been neatly dissected. This is the most uncommon case. In the second, which is more usual, the ulcerative process advances from the mucous to the submucous and muscular tissues, and in some instances to the subserous and peritoneal membrane. This process differs from the other in this respect, that lymph is irregularly deposited, that there is considerable swelling, and sometimes a true abscess is formed. More frequently, however, small portions of the mucous membrane are detached in isolated points by ulceration, and though the subjacent tissues are exposed, there is no regular cavity or abscess, but merely an ulcerated depression, which secretes purulent matter. In the more severe cases, in which the suppurative or ulcerative process has penetrated the different coats, communications are formed between the bladder and the neighbouring parts. The most ordinary of these modes of communication are the general cavity of the abdomen, or the rectum in both sexes, and the vagina in the female. In the first case, besides other symptoms, the escape of the urine gives rise to fatal peritoneal inflammation; in the second and third, its escape by unnatural passages produces much local irritation and general distress, and eventually may terminate in death.

Chronic *Cystidia* or Cystic Catarrh.

The termination of *Cystidia* in chronic inflammation is most frequent in those who have laboured under repeated attacks of acute cystic inflammation,—those who have had urethral or prostatic inflammation, or other disease of these parts,—those whose general health has been much impaired,—and finally, those advanced in life. It is also not uncommon in those liable to sabulous, or lithic concretions of the urine. Its pathognomonic sign is the discharge either of thickened, viscid, or puriform mucus, sometimes alone, always when the urine is expelled, which is thus opaque, milky, and turbid. In the healthy state, the cystic mucus is so thin that it is easily miscible with the

urine, and so trifling in quantity, at least in the urine discharged, that its presence is rarely observed. What is called cloudy urine generally contains a little more of this mucous matter than usual. When the mucous membrane is inflamed, this secretion undergoes changes similar to those which take place in the mucous secretion of other membranes in a state of inflammation. It becomes thick, viscid, and more copious, and in some instances is converted into a puriform or purulent fluid, and is occasionally reddish or streaked with blood. In this state it is not miscible with the urine, but, being mechanically mingled with it, renders it opaque and milky, and after standing some time falls to the bottom of the vessel. The cystic mucus thus expelled is derived from a membranous surface in nearly the same state as occurs in chronic pulmonary catarrh; and the disease, which it indicates, has been long known by the name of catarrh of the bladder (*catarrhus vesicæ*; *cystirrhœa*.) The other symptoms to which cystic catarrh gives rise are, weight and uneasiness, sometimes tension in the hypogastric region, heat in voiding the urine, uneasy dryness of the skin of the legs and feet, with burning of the soles of the feet, thirst, quick pulse, impaired appetite, and general wasting. The constitutional disturbance and the wasting occasioned by the local irritation generally prove fatal, or induce some fatal disease.

MORBID APPEARANCES.—The mucous membrane of the bladder presents all the usual effects of inflammation. The membrane is more or less, sometimes very much, reddened and injected, rough, covered with viscid, opaque, not unfrequently puriform mucus. In some instances, minute abrasions or ulcers are presented. In the chronic form of the disease, the membrane becomes thick, firm, and almost cartilaginous, with roughness and granular irregularity of its surface; and not unfrequently it is formed into pouches or cysts (*sacculi*;) by the irregular contraction of the muscular coat.

ETIOLOGY.—The causes of cystic inflammation, acute, sub-acute, and chronic, are those of mucous inflammation in general, and those which particularly affect the mucous membrane of the bladder. The latter membrane may be inflamed in consequence of the extension of inflammation from the urethra and prostate gland, and hence cystic inflammation is not an uncom-

mon result of *gonorrhœa*. The internal use of cantharides, or their external application, so as to produce absorption, is a frequent cause, first of irritation, and then of inflammation, not only of the cystic mucous membrane, but it appears of the whole urinary membrane, from the *pelvis* of the kidney to the *urethra*. Dr John Home, Prosector in the Royal Infirmary, has recognized in the bodies of persons dead shortly after the external application of blisters, much vascular redness, and sometimes blood-shot patches on the ureteric and vesical mucous membrane. This is an interesting fact, taken in connection with the observations of Bretonneau, upon the influence of the oleaginous or ethereal solution of cantharides on the mucous surfaces. There is reason to believe, that in the former case it is absorbed, and is applied directly by the urine to the uterico-vesical mucous membrane.

Some of the resinous oils have a particular tendency to irritate and inflame the vesical mucous membrane. The effect of the volatile oil of turpentine, in this respect, is well known. I am acquainted with an instance in which the internal use of this article in small doses induced in the vesical mucous membrane, acute inflammation, which was followed by more chronic action.

Besides the causes now mentioned, the irritation of urinary concretions, and even of the urine itself, may be followed by vesical mucous inflammation. The mulberry calculus, in particular, and sometimes other *calculi*, if numerous, give rise to catarrh of the bladder.

A peculiar cause of cystic catarrh is observed in the aged, the bed-ridden, and the paralytic. In the former class of cases, when the bladder loses its natural and healthy sensibility to the stimulus of the urine, or, though it retain this sensibility, if it have lost the voluntary expulsive power, as in all cases of *paraplegia*, and many of diseased spine, the unduly long retention of the urine, combined with over-distension, irritates, and eventually inflames the mucous membrane, and in no long time establishes a genuine catarrh of the bladder, which, by the use of the catheter, admits of alleviation, but very rarely of cure. This species of vesical catarrh, I have seen several times in connection with diseased spine; and in two instances I examined the state of the bladder after death, and found the mucous membrane not only much injected and very vascular,

but rough, and thickened, and covered with adherent puriform mucus.

TREATMENT.—Acute *Cystidia* is to be treated in such a manner as to promote resolution, and to prevent ulceration, or the accession of the chronic form. This will be accomplished by blood-letting, general and local, cathartic medicines sufficient to prevent constipation, the copious use of diluent and unstimulating liquors, and the tepid bath, or the hip-bath. After the urgency of the pain and local suffering has been abated by full bleeding from the system, the bowels should be emptied by castor oil, or repeated emollient glysters; and the urine should be diluted by the free use of linseed tea (*infusum lini usitatissimi*;) barley-water, decoction of common mallow (*Malva sylvestris*;) or of marsh-mallow (*Althæa officinalis*.)

The management of chronic *cystidia* is always difficult, and sometimes complicated. Reason would show that the indications are chiefly to moderate or check the local inflammation, and to support and strengthen the constitutional powers. For the first object, as the kind of subjects rarely admit general depletion, the application of leeches must be best. Gentle cathartics, chiefly to obviate costiveness, and keep the alimentary function right, are indispensable. Diluents here have small effect. Perhaps the injection of astringent solutions, as lime-water, or infusion of the vegetable astringents, is the most effectual and rational method of alleviating or removing the disease, and where the patient can be made to submit to this treatment, it should be employed.

In addition to these measures, blisters repeatedly applied to the loins, or an issue produced by caustic potass or moxa, by their counter-irritating powers, sometimes relieve the sense of internal heat and pain, and moderate the quantity of mucus discharged. Care must be taken, however, in using blisters, that they be not retained so long as to be absorbed.

The second indication, that of supporting the general powers, must be accomplished by moderate diet, which furnishes sufficient strength without aggravating the local inflammation. Various substances, chiefly of the astringent kind, have been found beneficial. The best of these undoubtedly is the whortleberry (*Arbutus uva-ursi*.) From ten to twenty grains of the powder of this substance may be given three, or four, or six times daily, as the stomach of the individual can bear it. Another

remedy of this description, which affords much relief in this disease, is lime-water taken to the extent of about half-a-pound or more in the course of the day. When the urine is decidedly acid, carbonate of soda, in doses of ten grains, or *aqua potassae* in doses of thirty drops, three or four times daily, is beneficial. The diet, which should be light, and sufficient to support the powers without stimulating, may consist of eggs, jellies, and thin digestible soups, with suitable admixture of milk and the farinaceous grains. The patient will derive much benefit from combining the Iceland moss or liverwort (*Cetraria Islandica*, Acharii,) properly prepared, with his usual food.

§. XVI. Scalding; Brenning; Clap. La Chaudepisse: La Scologione. *Urethria Urethræa*; *Blennorrhæa*; *Blennorrhagia*; *Gonorrhæa*. Tripper, German.

Alvarez de Fonseca Tratado de la Gonorrhæa e outras cosas. Lisboa, 1649. 8vo.—Antonio Cangaloes Tratado de Gonorrhæa. Lisboa, 1669. 4to.—A Treatise of all the degrees and symptoms of the Venereal Disease in both sexes, &c. By John Marten, Surgeon. London, 1704. 4th. edit. 1708.—The Symptoms, Nature, Cause and Cure of a Gonorrhæa. Lond. 1713. By William Cockburn, M. D. F. R. S., &c. 2d. edit. London, 1715.—Three Letters concerning the History of the Antiquity of the Venereal Disease. By William Beckett, Surgeon, F. R. S. Phil. Transact. 1717, 1720; republished in Collection of Surgical Tracts. London, 1740.—Description of the Venereal Gonorrhæa, by James Neville. London, 1754.—Traité Complet de la Gonorrhœe virulente des Hommes et des Femmes. Par Jacques Daran. Paris, 1756.—On the Cure of Gonorrhæa or fresh contracted venereal infection, by William Rowley. London, 1771.—J. Cl. Tode Vom Tripper, in Ansehung seiner Natur und Geschichte Kopenhag. 1774.—An Essay on the Theory and Cure of the Venereal Gonorrhæa and its consequent Diseases, by John Andree Surgeon, &c. London, 1777. 2d. edit. Lond. 1781.—Observations on the cure of the Gonorrhæa, by Samuel Foart Simmons, M. D., &c. London, 1780.—Essay on the Gonorrhæa, by William Thomas. London, 1780.—A Treatise on the Gonorrhæa, &c. by Peter Clare, Surgeon. London, 1781.—Dissertation on the Lues Venerea, Gonorrhæa, and Tabes Dorsalis, by W. Perry. London, 1786.—A Treatise on the Venereal Disease, by John Hunter. Lond. 1786.—Theoretische-practische Abhandlung uber den Tripper. von Aug. Fr. Hecker. Leipsig, 1787.—Michael Angelo Rolni Della Gonorrhæa virulenta. Neapoli, 1790.—Fr. Teytaud Traité de la Gonorrhœe et de maladies des voies urinaires. Paris, 1791.—A Treatise on Gonorrhæa Virulenta, &c., by Benjamin Bell. Edin. 1793.—Traité Complet sur les symptomes, les effets, la nature, et le traitement des Maladies Syphilitiques, par F. Swediaur, 2 tom. Paris, 1793.—Treatise on the Venereal Rose, commonly called the Virulent Gonorrhæa, by William Butter. London, 1799.—On the Cure of *Gonorrhæa Virulenta* in Men, &c., by Thomas Whately, Surgeon. London, 1801.—De la Gonorrhée benigne et de fleurs Blanches, &c., par J. J. Daussin Dubreuil. Paris, 1801.—Practical Observations on the *Gonorrhæa Virulenta*, by Robert Barker. London, 1802.—Deutsche Anweisung die verschiedenen arten des Trippers zu erkennen und richtig zu

behandeln von Aug. Fried. Hecker. Erfurt, 1802.—Lieberkühn Diss. de Me-dorrhœa a concubitu et potissimum de illius natura. Goettingæ, 1802.—Traité Complet et Observations Pratiques sur les Maladies Veneriennes, &c. Par Le Dr Dom. Cirillo prem. Medecin etc. Traduit de l'Italien, by Ch. Ed. Auber D. M. Paris, 1803.—Essai Analytique sur la non-identité des virus Gonorrhœique et Syphilitique, par J. F. Hernandez. A Toulon, 1812.—A Treatise on the Diseases of the Urethra (Vesica Urinaria Prostate and Rectum,) by Charles Bell, Lond. 1820.—A Practical Treatise on Urethritis and Syphilis, &c. &c., by William Henry Judd. London, 1836. 8vo.

The urethral membrane, though forming a part of what has been termed the genito-urinary mucous system, differs, however, considerably in anatomical and sensible characters, from mucous membrane in general. It is perfectly smooth, and even polished; in general, it is moistened with a thin transparent fluid, not like mucus, and possessing a peculiar odour. It presents neither glands nor follicles, strictly speaking, but is at particular parts formed into certain hollow folds, which anatomists have termed *lacunæ*. It is more like the inner membrane of the cheeks, than any other part of the body, but is paler, and smoother than this surface.

Examined from the cystic, to its opening extremity, it presents various divisions, which it is convenient to enumerate in the following order; the prostatic, the membranous, the bulbous, and the spongy portions of the canal, according to the parts to which each is attached. The prostatic portion of the mucous membrane is remarkable for sending portions into the ejaculating or seminal ducts, which, at this part, open into the canal, and into the prostatic ducts, which also connect it with the gland. The membranous portion of the mucous membrane is nothing particular; but in the bulbous part we find it continued into the ducts of Cowper's glands; and from this, to near the orifice, it almost exclusively forms the recesses termed mucous sinuosities of Morgagni. These hollows, which, if not discovered, were first well described by this anatomist, appear in the form of small openings along the urethral membrane, are about two or three lines in length, and of size varying from the diameter of a needle to that of a crow-quill.

This membrane may be the seat of inflammation, of at least two different kinds; one circumscribed and unsuppurative; the other spreading, and accompanied with copious discharge of puriform or purulent matter.

a. Common inflammation of the *urethra* consists in the swelling,

pain, and redness of a certain part, or tract of the canal, which thus becomes much narrower, or even undergoes a temporary obliteration. This affection is thus attended with painful tension of part, or the whole of the penis, suppression of urine, sometimes priapism, and constitutional disturbance, arising at once from the local irritation, and the anxiety occasioned by the difficulty of voiding the urine, or its total suppression. This form of urethral inflammation is too frequently considered as stricture, and erroneously treated as such. The introduction of the catheter or bougie never removes, but aggravates the complaint. The proper mode of treating it, is to adopt antiphlogistic remedies, and those means of relaxation, the utility of which experience has demonstrated in diseases of the urinary organs. Of all these means, the best and most efficacious are blood-letting, or the early application of leeches to the member, immersion in the warm-bath, as soon as they fall off, and a full dose of castor oil. Small doses of the muriatic tincture of iron have been also employed with great benefit; but the means chiefly to be trusted to are the warm-bath, the use of local bleeding, and full evacuation of the bowels.

This form of urethral inflammation is somewhat peculiar in its nature. It appears to be more circumscribed in its site, and to have a greater tendency to pass to the submucous cellular membrane, than the proper mucous inflammation. It is probable that it may occur at any part of the canal; but its most ordinary situation is the membranous portion. It terminates either in resolution, or effusion of lymph with formation of abscess, but never in mucous or puriform discharge.

b. The second form of urethral inflammation is very well known, and would scarcely require being noticed in this place, unless for the sake of uniformity, and showing the propriety of discontinuing the use of the present unreasonable name of gonorrhœa, by which it has been long known. A discharge of thick, opaque mucus, or puriform fluid from the *urethra*, is the distinguishing sign of this disease; but, connected with it, are other circumstances, to which the pathologist must attend, if he wishes to form a correct idea of the origin and nature of the fluid discharged.

After the manner in which I have viewed other mucous discharges, it will be almost superfluous to say, that the fluid of

gonorrhœa is of inflammatory origin. This fact, however, is most certainly established by the swelling of the urethral orifice, the pain, and tenderness of the canal, and the sore, or scalding sensation (*ardor urinae*), occasioned by the transit of the urine over it. At an early period of the art, when pathological knowledge was either defective or erroneous, this discharge from the urethra was believed to consist of seminal fluid, and to proceed from the organs by which that fluid is secreted; and the name of genital flux, or *gonorrhœa*, was thus absurdly applied to it. Afterwards, when medical practitioners knew the nature of the discharge, as distinct from seminal fluid, it was believed to be purulent matter, discharged by ulcers in the canal. This opinion, which was certainly more rational, has, however, been completely disproved; and Morgagni, Stoll, (*Rationis Medendi Partis iidae*. Cap. xvii. p. 400.) and Mr John Hunter, (*Treatise, &c.* Part ii. cap. i.) showed by dissection of persons whose death had occurred while they were affected with urethral discharges that though minute ulcers were occasionally found in the canal, they were totally unconnected with the discharge, which, in the greater number of cases, was secreted by the urethral membrane, in a state of inflammation.

According to the most accurate observations, there are several regions of the urethral mucous membrane, which, without being ulcerated or eroded, may furnish the puriform discharge. The first of these is 1 inch, or $1\frac{1}{2}$, or 2 inches of the membrane, from the orifice of the canal, viz. the space called *Navicular Fossa*, that is, the anterior end of the spongy portion of the membrane, which, in the dissections of J. Hunter, was uniformly found redder, and more vascular, or, as he calls it, more bloodshot than usual, with the *lacunæ* often filled with matter. In cases, however, in which the inflammation is more extensive, the membranous part of the canal, Cowper's glands, and their ducts, are involved in the morbid action. This, however, is exceedingly rare, according to Litre, Morgagni, and Baillie; and J. Hunter has remarked, that if the matter of clap were secreted and deposited, either beyond, or in the bulb, it would be incessantly ejected by the muscles, as occurs to the urine and seminal fluid. In cases yet more extensive, the prostatic part of the urethra has been known to be inflamed; and in very severe and violent forms of clap, the inflammatory action has been found to extend to the bladder itself.

It thus appears that no portion of the canal, from its orifice to the neck of the bladder, is exempt from this spreading inflammation. Every part of the membrane between these two points has been found more or less reddened, slightly villous, somewhat vascular, and more or less swelled, so as to induce a sensible diminution in the calibre of the canal. Dr Baillie observes, that the inflammation sometimes passes from the inner or mucous membrane to the surrounding tissue of the spongy body, which thus becomes larger and harder, in consequence of effused lymph, and more vascular than in the natural state. The same action also may affect its glands, and render them larger and harder than natural, like small tubercles. It is not improbable that this morbid state of the spongy body gives rise to the painful sensation and spasmodic action, termed *chordée*. (Hunter ; Baillie in *Morbid Anatomy*).

The symptoms vary according to the stage and intensity of the disease. In all cases there is scalding (*ardor urinæ*) and more or less difficulty in voiding the urine. In some this discharge is impeded, or comes away slowly and not directly from the bladder, or by the expulsive power of the detrusor. In very intense cases, in which the inflammation extends to the prostate gland and neck of the bladder, the urine is retained, and gives rise to much suffering and torture. This is not unfrequently but very improperly called stricture. It is, indeed, in one sense, stricture ; but it must be regarded as the result of swelling of the membrane and contraction of the canal, of an acute inflammatory character, and should be treated accordingly.

Inflammation of the urethral mucous membrane may arise from the operation of any of the ordinary causes which induce inflammation of mucous surfaces,—cold, or excessive heat, mechanical injury or irritation, chemical injury, or the application of peculiar animal secretions. Hot and pungent substances, especially spices which contain a stimulating essential oil, have been known to induce the disease. But the most ordinary and frequent cause is the application of the matter of gonorrhœa, either in sexual intercourse or otherwise. To discharges proceeding from the first order of causes, the general name of simple running (*gonorrhœa simplex*) has been long given ; while to the discharge resulting from the other, the term of virulent or poisonous running (*gonorrhœa virulenta*,) has been restricted.

Though virulent gonorrhœa has been very generally ascribed

to the effect of a peculiar morbid animal poison, it is by no means agreed whether that be of a specific and distinctive character or not. It was at one time imagined that urethral puriform inflammation was the result of the venereal or syphilitic virus applied to the mucous membrane of the urethra. That this was an erroneous and gratuitous view, however, was first maintained by Zeller and Cockburn, and afterwards by Sigwart, B. Bell, Dr Duncan Senior, and John Clement Tode; and the opinion has since been very general, that urethral puriform inflammation is the effect not of the venereal virus, but of a separate poisonous material. Of this opinion, a most elaborate defence was given in 1812, by Hernandez.

It is nevertheless not perfectly certain that urethral puriform inflammation is always the result of the application of a particular poisonous material. It has been stated by various competent observers, that a female having *leucorrhœa* may communicate to the male with whom she is connected, an inflammatory disease of the urethra, with puriform discharge, not to be distinguished from true gonorrhœa; and some have further maintained, that the matter of pustular or other sores in the vagina, or on the penis, of syphilitic origin, has given rise to gonorrhœa. It is so far fortunate, however, that these differences in the nature of the alleged causes do not produce any material difference in the discharge, or are important in a therapeutic point of view.

In cases in which the disease is observed to succeed suspicious connection, it has appeared from fifty hours (Testa) to ten days (Plenciz,) afterwards; and the average is stated by Do-meier to vary from the fourth to the fourteenth day after exposure.

TREATMENT.—Urethral puriform discharge, from whatever cause originating, is to be treated as an inflammatory disorder.

It is rare, however, that it is requisite to employ general blood-letting; and most practitioners as well as patients, are averse to have recourse to a remedy so powerful for a disorder so common, and often considered very trivial.

The principal point in the treatment is to enjoin the use of low diet, as much rest and coolness as are practicable, laxative medicine as the bowels require, and the solution of acetate of ammonia, or even the antimonial solution.

It is of much moment also, in order to abate the scalding, to

employ diluents; and the most usual are linseed tea, or gum-water, or common tea.

If pain take place along the course of the *urethra*, leeches on the perineum are the appropriate remedy.

If this pain become more intense, or if there be difficulty in voiding the urine, or suppression, a full blood-letting should be drawn from the arm, the bowels ought to be opened by castor oil, and the patient should be placed in the warm bath.

After the urgent scalding is gone, it is sometimes beneficial to employ the hot stimulating and pungent medicines. Of these, cubebs pepper is in common use, and a tea spoonful may be taken four or five times daily.

It has been a question of much interest, and often agitated, whether the use of injections be safe or beneficial in the treatment of gonorrhœa? As in some instances the discharge has under their use subsided rapidly, it has been argued, that it is idle to allow a disorder to proceed for weeks, which might by this means be checked in a few days. Against their use it has been said, that in the early stage of the disease, they aggravate inflammation; that there is a chance of impelling the secreted matter from the diseased to a healthy part of the canal, and thus extending the disorder; and that at all times, and under all circumstances, they are liable to induce local circumscribed inflammation of the *urethra*, and thus give rise to stricture, and sometimes more serious disorders, as swelled testicle, &c.

It cannot be denied, that in many instances the premature use of injections, especially if very astringent, has been followed by stricture and swelled testicle; but it must be allowed that these are also the effects of the disorder itself. In general, however, the safest and the best recoveries are effected by means of mere antiphlogistic remedies without the use of injections. If, however, it be determined to use them, it is convenient to know, that those which are strongest in their astringent powers, seem to be best adapted for the purpose. The nitrate of silver, which has been found so useful in other inflammations of mucous surfaces, is also in this very efficacious; and a solution consisting of ten grains to the ounce has been injected not only with impunity, but with great benefit.

Other substances used in this manner, are strong infusion of green tea, solutions of sulphate of zinc, sulphate of copper, and acetate of lead.

When the opaque thick puriform discharge ceases to flow, it often happens that a thin serous fluid continues to ooze from the urethra for weeks or months. This is called a gleet. The cause of this may be one of two states of the urethra, 1. either a morbidly sensible portion left in a state of low chronic inflammation, or, 2. a strictured part in the same state.

In either case, the best remedy is the occasional introduction of a catheter or staff, either with the view of diminishing morbid sensibility, or producing mechanical dilatation, and absorption of effused matter. The first effect is in general an increase in the discharge, and its reconversion into thicker and more puriform matter; but this soon subsides, and afterwards disappears permanently.

To this method of treatment, again, some are averse; and several practitioners prefer rubbing the external part of the course of the urethra by camphorated mercurial ointment.

Others, again, propose for the removal of gleet, the use of the balsamic stimulating substances, as balsam of Tolu, balsam of Peru, balsam of Copaiba, or Venice turpentine. The last made into pills with sulphate of zinc, as recommended by Dr Graham, I have several times seen of use. But the great remedial measure in this disease, and the one which eventually becomes requisite, is the periodical introduction of the catheter, staff, or bougie.

§. XVII. Uterine Catarrh, *Leucorrhœa. Fluor Albus*, or Whites.

Leucorrhœa, Sauv. G. 276. *Leucorrhœa Americana*, Sauv. sp. 5. *Leucorrhœa Indica*, Sauv. sp. 6. *Leucorrhœa Nabothi*, Sauv. sp. 9. *Menorrhagia decolor*, Sauv. sp. 7. *Menorrhagia alba*, Cul. Fleurs Blanches. Das Weisser Fluss; Das Weisse. *Medorrhœa Muliebris*, Seegert.

A Treatise on Female Diseases, in which are also comprehended those most incident to Pregnant and Child-bed Women. By Henry Manning, M. D. 2d edit. London, 1775, p. 155.—Wenceslai Trnka de Krzowitz *Historia Leucorrhœae*. Vindobonae, 1781.—Medical Instructions towards the Prevention and Cure of Chronic Diseases peculiar to Women, &c. By John Leake, M. D. Two vols. Lond. 5th edit. 1781. Vol. i. p. 98.—An Introduction to the Practice of Midwifery. By Thomas Denman, M. D.—De *Medorrhœa Muliebri*. Auctore Jo. Frederico Wilhelmo Seegert, Medico Lansberga Brandenburgico. Brera Sylloge. Vol. v. p. 1. Ticini, 1801.—Observations on those Diseases of Females which are attended by Discharges, &c. &c. By Charles Mansfield Clarke, Part i. London, 1814, and Part ii. Lond. 1821.—*Traité Pratique des Maladies de l'Uterus, et de ses Annexes*. Par Madame Veuve Boivin, et par M. Dugés, iii. Tom. Paris, 1833. Tom. ii. Chapitre vii. Flux Muqueux de l'Uterus, p. 344, Tome ii.

The discharge of white, opaque, milky fluid from the womb and vagina of the female, termed *fluor albus* or whites, Cullen referred to the head of Menorrhagy, or excessive menstruation; and every whitish or opaque discharge unconnected with local disease, that is, disease of the womb itself, he regarded as of this description; because, says he, the white discharge generally, nay almost always, is combined with menorrhagy, or follows it, and it is probable that it issues from the same vessels which furnish the menstrual secretion, and arises from the same causes, from the period at which it appears.* These reasons are not satisfactory.† With equal justice might it be maintained, that catarrh and spitting of blood were species of the same disease, or that coryza was the same as epistaxis. But, independent of this, it may be shown that, strictly speaking, there is no instance of *whites* totally unconnected with local disease; for either the mucous membrane of the womb itself, or that of its neck, or the muciparous follicles termed glands of Naboth, or the membrane or mucous follicles of the vagina, must be in a state of chronic or catarrhal inflammation, in order to produce the discharge known by this name.

The *fluor albus*, whites, or female weakness, is described by Dr Manning as a discharge of serous matter from the genital parts of women. It is defined by Leake to be a disease of the womb and its contiguous parts, with the discharge of a pale-coloured, greenish, or yellow fluid, attended with loss of strength, pain in the loins, bad digestion, and a wan sickly aspect. By Denman it is said to be a “mucous, ichorous, or sanious discharge from the *vagina* or *uterus*,”‡ a character which is more remarkable for its comprehensiveness than for its precision. It may be doubted whether this is much improved by Sir C. M. Clarke, who gives it the name of vaginal discharge, (*profluvium vaginale*;) and defines it as a “fluid flowing from the *vagina*, varying in consistence, quantity, and colour, produced either by weakness of the constitution, or by a change in the structure, position, or actions of the neighbouring parts.”§

This author is, however, more correct in regarding the discharge as a symptom or effect of disease, not a disease itself. The inner surface of the womb and *vagina* consists of a mem-

* Synopsis Nosologiæ ad Genus Menorrhagia, p. 164, note.

† Medical Instruction, &c. Vol. i. p. 98. chap. ii.

‡ Midwifery, p. 186., Vol. i. § P. 31.

brane, which in the healthy state secretes a mucous fluid only, and that in small quantity. From any causes which over-irritate this surface, the natural secretion may be increased in quantity, and considerably changed in quality. The varieties thus formed which are to be noticed here are three; the transparent mucous discharge, the white mucous discharge, and the purulent discharge.

1. The transparent mucous discharge is gelatinous, nearly transparent, and capable of being coagulated. From the account given by Sir C. M. Clarke, it appears to depend on a slow inflammation of the womb, which becomes slightly enlarged, connected also with a general plethoric state of the system; or upon the same state of the womb occurring in enfeebled relaxed women, whose constitution has been impaired either by child-bearing, suckling, or evacuations which have been too great. The source of this discharge is the mucous surface of the womb principally; and there is little doubt that it forms a great proportion of the cases regarded as *fluor albus*. This discharge occurs as a symptom also in prolapse of the womb, bladder, or *vagina*, in inversion of the womb, cancer, polypus, fleshy tubercle, and even warts of the womb; and the practitioner must therefore be careful in distinguishing whether it is connected with mere inflammation, or more serious disease.

2. The white mucous discharge is opaque, of a perfectly white colour, resembling in consistence a mixture of starch and water made without heat, or thin cream, easily washed from the finger after examination, and capable of being diffused through water, which it renders turbid. It is of consequence, in the correct diagnosis of the affection, on which this discharge depends, to attend to the properties now enumerated; and with this view, the examination must be made when the patient has remained at rest for some time, without disturbing the parts. Unless this precaution be taken, it may be confounded with the ordinary mucus of the *vagina*, which, though transparent in the natural state, yet, when secreted in sufficient quantity to run down the *labia*, becomes in consequence of the motion in the act of walking, and admixture with air, white and opaque. The white mucous discharge is in some instances thicker than cream, and as tenacious as melted glue; but in this state it does not flow spontaneously, and is gene-

rally discharged only when the contents of the rectum are expelled, or it continues in the vagina till it is rendered thinner and more fluid by the mucus of that canal. There is reason to believe that this mixture always takes place in women of strong passions, in whom these discharges have a milky hue.

According to the observation of Sir Charles M. Clarke, this discharge of white mucus depends on an inflammatory condition of the *cervix* of the womb, and its mucous glands, (*glandule Nabothi*). To this conclusion he was led, by observing that, in a considerable number of examples of the discharge, however the morbid phenomena might vary, there were uniformly tenderness of the *cervix*, and even considerable pain in certain circumstances. This appears, therefore, to be the same disease which Manning, Leake, and many other authors remark as a variety of *fluor albus*, incident to young females, eight or ten years old. In this case, the *os uteri* is generally felt large, soft, and tumid, and a little irregular, by the enlargement of the mucous follicles. It is not, however, an acute inflammatory disease, but rather a peculiarly irritable condition of the mucous membrane with its follicles, which extends from the neck of the womb, through the *os tincae* to the superior extremity of the vagina, and which then becomes the source of the white opaque discharge. It occurs chiefly in subjects liable to catarrhal and glandular affections.

In many cases, excepting the mere discharge, few marked symptoms appear. In others, they occur various in degree and number. The patient does not always complain of local pain; and, unless the circulation is affected by riding, dancing, violent walking, the menstrual function, or the natural consequences of marriage, she rarely experiences much inconvenience. But if she be exposed to the operation of such causes, especially when aggravated by constipated bowels, much uneasiness is felt in the lower part of the belly, and the site of the *cervix*, which amounts to great pain when the feces are voided, or when the parts are otherwise exposed to straining or pressure; and a sense of uneasiness, weakness, and gnawing pain is felt in the lumbar region, which is generally so severe, that the patient cannot retain her person in the sitting position. In this the bladder, especially its neck, partakes; and strangury or retention of urine may take place. The menstrual discharge

is either scanty, and secreted with pain and difficulty, or it is entirely suppressed.

3. When the mucous membrane of the womb or vagina is inflamed, it may secrete puriform or purulent fluid. In inflammation of the mucous membrane of the womb, the menstrual discharge is suppressed; pain, weight, and uneasiness are felt in the hypogastric and pubic regions, gnawing pain in the loins, and in some cases, by sympathetic communication, stranguary and tenesmus ensue. When the *vagina* is the source of puriform inflammation, it is to be distinguished by the absence of the symptoms which attend similar disorders of the uterine mucous membrane, by scalding and heat of urine, and by the sense of pain in the vagina. Puriform or purulent inflammation of the uterine and vaginal mucous membrane is to be distinguished from abscess of the *labia*, the *nymphæ* or *vagina*, from corroding ulcer of the mouth of the womb, from cancer of the *rectum*, or of the womb, and from gonorrhœal inflammation.

DIAGNOSIS.—These several discharges should be distinguished, not only from each other, but from other diseases of the womb and *vagina* in which they occur. The first object will be best attained by attending to the characters already laid down.

To ascertain whether the transparent mucous discharge arises from mere inflammation of the utero-vaginal membrane, or from prolapse or inversion of the womb, or, indeed, any organic disease, examination is requisite. If neither prolapsus of the womb, bladder, or *vagina* be recognized, if the womb be found without inversion, if there be no scirrhus hardness or irregularity at its orifice, and if neither polypus, fleshy tubercle, nor warts be detected, then it may be inferred that the discharge depends on chronic inflammation of the inner surface of the womb. If the discharge be simply purulent, occasionally streaked with blood, but without lancinating pain, thickening or tubercular induration, it is probable that the patient labours under corroding ulcer of the mouth of the womb.

Between whites and the discharge of gonorrhœa, distinctive marks have been made by almost all the authors from Manning and Leake to the present time. But these marks are by no means easy in application; and I have seen instances of gonorrhœal discharge in females more than once mistaken for leucorrhœa. The colour of the secreted fluid is evidently an insuf-

ficient criterion, and does not furnish in all instances a perfect diagnostic mark. It is, however, important to know, that, besides the yellow puriform appearance of the gonorrhœal discharge, and its property of leaving a deeper stain on linen, the gonorrhœal secretion is more thick and puriform but less viscid and glutinous. It seems to contain more granular solid matter than the leucorrhœal, which again consists chiefly of viscid, glutinous, and tenacious matter.

More unequivocal diagnostic marks are derived from the history of the case and the observation of the respective symptoms. Thus, in gonorrhœa, the parts, especially the *nymphæ*, are red, tender, and cannot bear to be touched, and are often swelled and hot, with much scalding and heat in voiding the urine. In leucorrhœa, on the other hand, the parts are rarely red or tender, and examination does not produce so much pain, unless in the case of enlargement of the *os uteri* or its glands, when pain is sometimes felt on pressure. In the case of leucorrhœa also, the *nymphæ* are not tense, or swelled, or tender; but the vagina is often relaxed, and the parts in general are flaccid. In gonorrhœa the pain, in the course, and at the orifice of the urethra, is the leading symptom. In leucorrhœa, the patient always has dull, heavy, aching or gnawing pains in the lumbar region of the back, and sometimes a sensation of bruising and uneasiness so great that she cannot maintain the erect posture. In gonorrhœa there is little or no disorder of the general health, and the looks are almost uniformly unchanged. In leucorrhœa, on the contrary, the general health is impaired, the appetite is bad, with flatulence, occasional squeamishness, and general weakness and faintness; while the complexion is pale or sallow, the features are languid, and the patient is listless and feeble. Hysterical affections, which are very often seen in leucorrhœa, are never necessarily observed in gonorrhœa. Lastly, gonorrhœal discharge is recent in origin, comes on suddenly, runs a certain course, and subsides entirely; whereas leucorrhœa comes on slowly and gradually, undergoes various oscillations, at times seeming to disappear, but always recurs, and continuing for months, or even years, shows often no tendency to subside altogether. In gonorrhœa the menstrual secretion continues; but in leucorrhœa it is either scanty, and accompanied with great pain and general disorder, or it is entirely suppressed.

Uterine Catarrh may assume two forms, the subacute and the

chronic. In general the subacute form of the discharge takes place in females who live freely, and who are more or less plethoric; and it seems to be connected with a subacute irritation of the mucous surface of the uterine cavity. It is often distinguished by a sense of heat and itching within the pelvis, micturition more or less painful, and by some heat, swelling, pain, and itching, at the neck and orifice of the womb.

The discharge is at first serous or slightly bloody, and afterwards it becomes puriform or mucous, thick, opaque, greenish or yellowish, and generally glutinous. At a later period, it may be white, milky, or of a milky aspect, mingled with viscid glairy fluid.

These different changes depend on the transition from the subacute irritative or inflammatory state of the mucous membrane of the uterus, to the chronic. The time occupied in this transition varies from thirty-six to forty days; and after its completion, the disease assumes the character of chronic or ordinary leucorrhœa.

This state is nevertheless afterwards liable to temporary exacerbations, according as the individual lives freely or abstemiously, as she is, or is not subjected to irritation of the reproductive organs, or disorder of the system generally; and not unfrequently at the menstrual periods exacerbations of considerable severity ensue.

Chronic or passive uterine catarrh is chiefly distinguished by being the disease of feeble relaxed females, those who are badly fed, and over-worked among the lower classes, and who are under the necessity of returning prematurely after confinement to their domestic duties or other laborious occupations.

The causes of uterine catarrh are either the causes of catarrhal affections generally, or those which operate more immediately on the reproductive organs.

Among the causes of catarrh generally must be classified cold or moisture in any manner applied, residence in cold, damp, ill-ventilated localities; insufficient clothing; innutritive food; excesses in the mode of living, especially when the individual is plethoric, late hours, fatigue, and mental disorder or distress.

Among the causes which operate on the reproductive organs particularly, are excess in sexual intercourse, *menorrhagia*, frequent pregnancies, and uterine hemorrhage, and premature return to the erect position and to laborious occupations.

In moist damp countries and localities uterine catarrh is almost endemial. Thus it has been long known to be very prevalent among females of all ranks in Holland, and it is very common in the marshy districts of the maritime Alps, in those of the department of Ain and Sologne, and in miasmatic districts in general.

When the discharge proceeds from the vagina exclusively, it is connected with relaxation of that canal, which is believed to lose the tension peculiar to health. Under such circumstances, its appearance is often connected with the operation of local irritating agents, physiological, mechanical, or chemical. Thus it has been known to succeed parturition, excessive venery, gonorrhœal inflammation, and the use of pessaries.

TREATMENT.—Of these several forms of vaginal discharge, the treatment should be made to correspond to the nature of the individual disorder. In the first form, attended with symptoms of plethora and increased action, the vessels should be unloaded by removing at once a large quantity of blood; the digestive organs should be put in a more healthy state; and the vaginal discharge is to be moderated or diminished by topical means, if these general measures have not already produced a beneficial change. If the presence of local symptoms, arise from fulness or tension of the vascular system, blood should be taken from the neighbourhood of the affected part by scarifications and cupping, or by leeches applied between the shoulders, to the lower part of the belly, to the loins, or even to the region of the liver. In order to improve the condition of the digestive organs, saline purgatives, as Epsom salts, or the tasteless salts, may be given in small doses three or four times daily. At the same time the diet should consist of grains, fruits, vegetables, and light puddings, but abstaining religiously from spirituous and fermented liquors. During this constitutional management, the local treatment should consist of injection of tepid water into the vagina, or of a decoction of any of the slightly astringent herbs; afterwards a weak solution of white vitriol may be used with advantage.

When there is reason, from the symptoms, to believe, that the discharge depends on local action only, without affection of the system, the remedies may also be of a topical nature only. Blood should be taken from the lower part of the belly, or from the loins, by leeches or cupping; or leeches may be advanta-

geously applied to the opening of the vagina, the *labia*, and vicinity. After the abatement of action by this depletion, the parts should be frequently washed with cold water; and injections of sugar of lead, sulphate of zinc, or alum, may be injected into the vagina in the usual manner. Under all circumstances, sexual intercourse ought to be entirely prohibited.

In the second form of transparent mucous discharge, that attended with symptoms of weakness and general wasting, the mode of treatment requires some modification. General blood-letting is unnecessary or prejudicial;—and even local depletion must be resorted to with caution and deliberation. Great attention, however, should be given to the digestive functions, the cutaneous secretion, and the state of the utero-vaginal membrane. With the first intention, the diet should be regulated, and the periodical evacuation of the alimentary canal secured. Leake recommends veal-broths, jellies, fresh eggs, and milk diet, with the acid fruits. With this Clarke agrees, adding the precaution of having bread properly fermented and well baked. All are unanimous in forbidding the use of solid animal food, till the powers of the stomach and bowels are in some degree restored. It may then be taken once in twenty-four hours, but should be continued or suspended according to its effects. Wine diluted with water is sometimes advantageous; but the immoderate use of tea is condemned. The safest substance for breakfast and afternoon repast in such subjects is coffee, and the powder of the cacao nut, or chocolate, if the stomach can bear it.

At the same time, the compound rhubarb pill, or the aloetic pill, exhibited one hour before each meal, will be found useful; and in some it will be found expedient to combine it with grain doses of ipecacuan, or small quantities of the saline purges. To those whose weakness or other idiosyncrasy is incompatible with these measures, the occasional use of emollient or purgative glysters proves a more useful substitute.

It was at one time the fashion to prescribe tonic or astringent medicines, as bark, chalybeates, and especially the white vitriol, to which may be added the Tunbridge Spa or Pymont waters, as recommended by Leake, with the view of giving solidity and strength to the general system, and especially to the fibres of the womb. The great danger lies in the too early and indiscriminate use of these medicines,—which are chiefly

beneficial after suitable evacuation, when they improve the tone of the stomach and bowels, and contribute to render the capillary circulation and secretion more uniform. Clarke recommends infusion of calomba, with carbonate of ammonia.*

With the view of improving the state of the skin, flannel or fleecy hosiery, the use of the flesh-brush, and gentle exercise in a dry clear air, are the principal means. In all cases flannel trousers are indispensable. Under the same head may be mentioned, the use of the cold bath, or spunging the loins with cold water.

Balsamic and stimulating medicines have been supposed to exercise a specific effect on this discharge; and the hot gums, olibanum, mastic, elemi, balsam of copaiba, and the balm of Gilead,† have all been highly praised as possessed of considerable sanative powers. Venice turpentine in doses of from three to five grains three times daily is beneficial. More lately, the cubebs pepper has by analogy been employed with alleged success. The truth is, some cases are more easily cured by one medicine than another; and at a certain stage, the disease will yield to a remedy which had previously been tried in vain.

Of local applications, two sorts have been employed, and variously commended; the vegetable and the mineral astringents. Of the vegetable astringents, the safest are said to be a strong infusion of green tea, or the leaves of the red rose; the most powerful, the decoction of oak bark, or of galls. The mineral astringents, sugar of lead, white vitriol, alum, or blue vitriol are recommended only with caution, and after the previous use of the vegetable. Palliative relief is derived from the use of volatile liniment, or a strengthening plaster to the loins.

The second form of vaginal discharge, the white mucous, is to be treated on much the same general principles. If symptomatic fever be present, general blood-letting will be expedient. But this is rarely requisite; and it is generally sufficient to take blood, either by cupping, or by leeches applied to the groins, or the lumbar region of the back, repeated according to the symptoms, and the relief afforded. The hip-bath at 90°, or fomentations of warm water, or decoction of poppies to the back, belly, and genital regions, may be used with advantage twice or three times daily; and tepid water thrown into the vagina by a syringe is a very comfortable and effectual means

* P. 291. † Denman, Vol. i. p. 108.

of relief. The bowels should be kept loose by small doses of the saline purgatives, aloetics, or castor oil; and strangury is to be relieved by mucilaginous drinks, and laudanum in suitable doses. If the urine be retained, the catheter must be used.

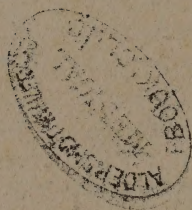
Purulent discharge may be treated in the same manner, and afterwards by the use of local astringents.

The uterine mucous membrane is further liable to a species of inflammation in which it secretes an albuminous fluid, which undergoes coagulation, and forms a false membrane, lining the inner surface of the organ, and from which it is discharged from time to time in the form of shreds and membranous moulds of the womb, more or less complete.

This disorder, which is attended with the usual symptoms of leucorrhœa, depends on a more intense degree of inflammation of the uterine mucous surface than takes place in uterine catarrh. It is a frequent cause of sterility.

It admits of little alleviation from medicine; but sometimes disappears spontaneously.

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